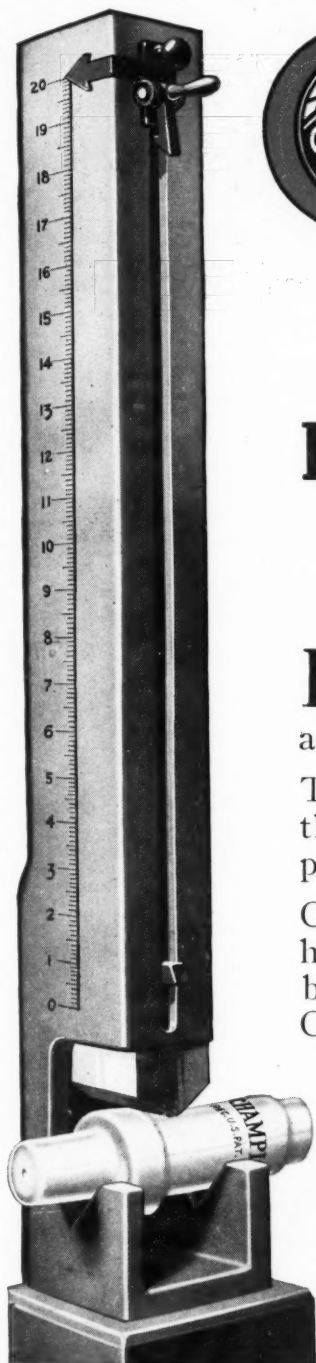


MOTOR AGE

Vol. XXXIV
No. 4

PUBLISHED WEEKLY
CHICAGO, JULY 25, 1918

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Three dollars a year



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Big Increase In Porcelain Efficiency

*2½ Times the Resistance
to Breakage from Shock*

HOW to make porcelain for spark plug insulation, offer greater resistance to shock and vibration!

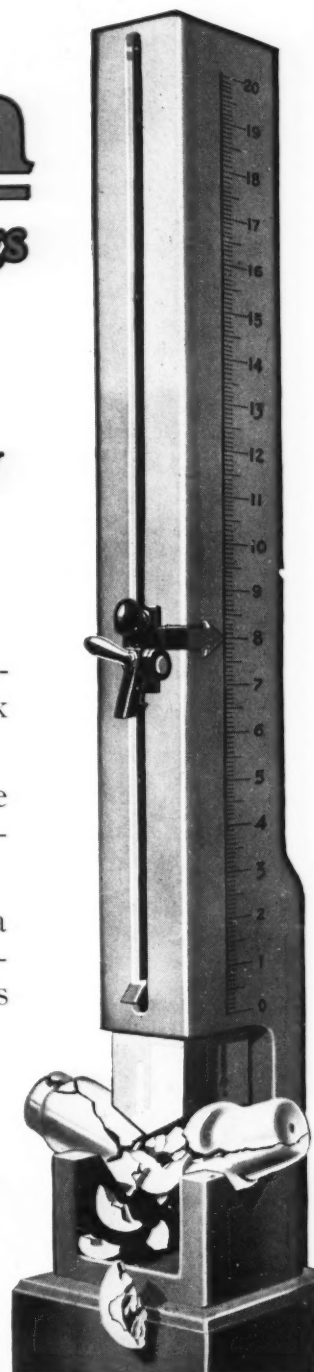
Ten years of original research work and the three-thousand-four-hundred-and-fiftieth experiment, revealed the secret.

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Champion Spark Plug Co., Toledo, Ohio



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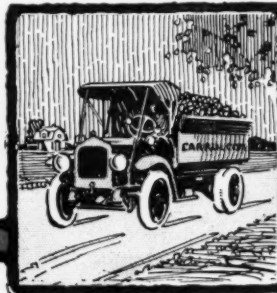
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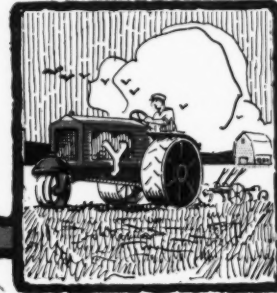
For Passenger Cars



For Delivery Cars



For Trucks



For Tractors

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speeding up the harvest*

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In the early days of the Tractor, little attention was given bearings because engineers assumed that a slow-speed vehicle only required bearings of implement design.

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Jamestown, N. Y.

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346-A

MOTOR AGE

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NEXT WEEK

Among the features of MOTOR AGE next week will be a special story on the opening of the National Tractor Demonstrations at Salina.

MOTOR AGE
MALLERS BUILDING, CHICAGO

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Sedan	2085
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7-Pass. Touring Car,	1545

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Prices f. o. b. Kenosha

NASH TRUCK FEATURES

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Electric lights and starter.
Unusually long springs, and the Hotchkiss drive.
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*Manufacturers of Passenger Cars and Trucks
Including the Famous Nash Quad*

NASH MOTORS

VALUE CARS AT VOLUME PRICES

When Writing to Advertisers, Please Mention Motor Age



Here is shown one of the many kinds of work the tractor can do—husking corn

Tractor Versatility

By Fred M. Loomis
Motor Age Editorial Staff

In Two Parts—Part I

Clearing Land

Clearing Brush Land
Pulling Stumps
Tearing Out Boulders
Hauling the Log Away
Clearing Chaparral

Harvesting

Cultivating Corn
Cutting Wheat
Harvesting Corn
Mowing Hay
Loading Hay

may be accepted as an established fact that a tractor cannot be considered an advisable investment, from the strictly economic standpoint, unless it can be kept busy at least 500 hr. during the farm year.

How is the farmer to estimate in advance of buying whether he has work enough on his farm or not to justify the purchase? If he farms 240 acres or more he need not worry. There should be no doubt in his mind. On farms of that size there always is work enough for a tractor, and the question in this instance resolves itself into one of size and type. With the solution of this we have nothing to do here. The question at hand is—and it is the question which most frequently will be asked of the tractor dealer and thus is of paramount importance—Can the farmer who works less than 240 acres use a tractor advantageously and will it prove to be an economical investment for him?

Let us take into consideration the average quarter section farm in the corn belt and see if it is possible to find on such a farm enough work to justify the purchase of a tractor which otherwise is adapted to the size of the farm and the character of the work that will be found thereon.

Miscellaneous

Crushing Rock
Sawing Timber
Well Drilling
Dredging
Heavy Pumping
Making Road
Moving Shed

On the Belt

Threshing
Silo Filling
Corn Shelling
Husking
Shredding
Hauling Crops to Market

Tillage Operations

Plowing
Harrowing
Disking
Seeding

WORK for a tractor which will occupy it for from fifty to seventy 10-hr. days during the year must be found upon the farm if the machine is to prove a good business investment for the average farmer. Unless the farmer can find tasks enough to utilize the power of his tractor to this extent then its economy for him, if, indeed, it can be proved to be an economy at all, must be dependent upon other considerations. Admittedly, this latter fact happens once in a while, but as a general proposition the farmer who cannot provide at the least fifty days' work would better not own a tractor.

Such a stint of work is not set arbitrarily. The minimum of economical farm employment for a tractor has been determined by experience. The United States Department of Agriculture and numerous state agricultural colleges have made exhaustive investigations among experienced tractor owners and the assertion made is based upon the results of these investigations. It

According to the United State Census reports the average corn belt farm of 160 acres will be diversified about as follows:

Corn, 50 acres;
Wheat and oats, 30 acres;
Hay, 20 acres;
Meadow, orchard, building and feed lots, etc., 60 acres.

Drawbar work on such an average farm for which a tractor will be found adaptable will divide itself about as follows:

Plowing, nine days, 90 hr.;
Disking and harrowing, seven days, 70 hr.;
Seeding small grain, one and one-half days, 15 hr.;
Harvesting corn, six and one-half days, 65 hr.;
Harvesting small grain, one and one-half days, 15 hr.
Mowing, raking and loading hay, two and one-half days, 25 hr.

This totals twenty-eight days, 280 hr., of possible tractor drawbar work. It is to



Clearing brush land

Clearing Land with a Tractor



Hauling away logs

Pulling stumps



Clearing chaparral

be understood, of course, that this is just a general estimate and is not to be considered in any sense of the word invariable, since the relative time devoted to these various tasks will vary with the farms. The figures given, however, are approximate average, based upon ordinary farm experience on corn belt farms of quarter section size.

It will be noted that the total is just a little more than half the minimum requirement for economical tractor employment. In exceptional cases the days devoted to corn planting and corn cultivation may be added to this total. There are double-row planters on the market which can be used behind tractors. Listers also are used occasionally, and a few tractors will cultivate corn more or less successfully. Adding the days consumed in such work, estimated to be from ten to fifteen, 100 to 150 hr., according to circumstances, and the total of drawbar use would be thirty-eight to forty-three days, 380 to 430 hr. This still is considerably below the minimum economical requirement.

How is the deficiency to be made up? In two ways. One is by utilizing the belt power of the tractor for driving all the power machines used on the farm and the other is by utilizing the versatility of the tractor for drawbar tasks other than those enumerated above. Yet few dealers, and still fewer farmers, realize the fact that



Tearing out boulders

there are other tasks for which a tractor can be used and they have no adequate conception of what a wonderfully versatile and adaptable power agent they have at their disposal in a tractor, nor do many of them, unless taught by actual experience, gain any notion of the number of farm tasks to which a tractor can be applied.

As a rule a farmer buys a tractor with its ability to perform certain special tasks mostly in view. In a vast majority of instances a tractor is considered primarily a plowing machine, with all its other power possibilities held as incidental. With interest centered upon its capacity to pull plows and thus to assume the peak load upon every farm, its capabilities in other directions are very likely to be minimized

or overlooked altogether. Yet it not infrequently happens that it is just the capacity of the tractor for other work which puts the machine safely within the category of economical farm equipment and which enables it to demonstrate on farms of 160 acres, and sometimes of even smaller acreage, that it is a profitable investment.

The dealer who is selling tractors, or who is about to begin selling tractors, well can afford to give this phase of the tractor subject careful consideration. He will find upon looking into the matter that there are more than forty distinct and recognized farming operations, all requiring power, to which the tractor can be adapted. It is true that all these forty are not to be found upon every farm, neither are all of



Plowing with tractor



Tillage Operations

Harrowing with spring tooth

Seeding, above

Disking, left



them to be found in every community. Possibly it never happens that all of them will be encountered in the territory covered by any one dealer. Nevertheless, it not infrequently happens that it is just these less obvious and secondarily important tractor adaptations, when they do occur, which measure the difference between loss and gain in tractor employment. It will be found, in addition, that upon every farm, no matter where it is located, there will be uses for a tractor besides the primary ones which occur to the mind of every farmer. From among the forty possibilities every farmer will be able to select enough to provide work for his tractor up to the point of economical operation and to demonstrate its utility and economy for him.

Dealer Must Guide

The dealer will find, too, that in most cases it will be he who will have to point out to the farmer the various less obvious applications of tractor power. It is not that the farmer is deficient in imagination or unable to make power adaptations or does not know how many power needs he has, but commonly he focuses his attention upon the more obvious and insistent of these and the others escape his notice. It devolves upon the dealer to remind him of them, show him how they may be met with tractor power and how such adaptation of the tractor will enhance its value

and how much it will contribute to its ultimate economy of operation.

It may be asserted without danger of contradiction that the tractor is the most efficient, the most versatile, the most adaptable power agent that ever has been put into the hands of the farmer. It will do more things for him, and do them better, quicker and, in the long run, cheaper than any other source of equivalent power he ever has known. But it happens in a majority of instances that the farmer himself has no adequate appreciation of this fact and only discovers it in the course of his own experience, unless it be called pointedly to his attention in advance by someone who has had previous experience or who has access to the results of the experience of others. This someone who can and should know all about such things is the dealer. The dealer's duty consists not alone in selling a tractor and in rendering the service necessary to keep it in efficient shape but also to indicate to the farmer how the latter can employ his tractor to the greatest economic advantage.

In order that the dealer may gain some conception of the adaptability of the tractor in furnishing power for the common and exceptional tasks found upon the farms of even small size, and that he may have in his possession the information which will enable him to present the full economic

aspect of the tractor to the prospective buyer, some consideration of the following classification of tractor uses may be found to be worth while. The classification is presented in the order of sequence of farming operations, just as if a tractor owner were to begin with virgin soil and utilize his tractor for every possible task from the beginning of the farm year to its close.

Naturally, tractor adaptations divide themselves into certain obvious classes, which may be characterized as follows:

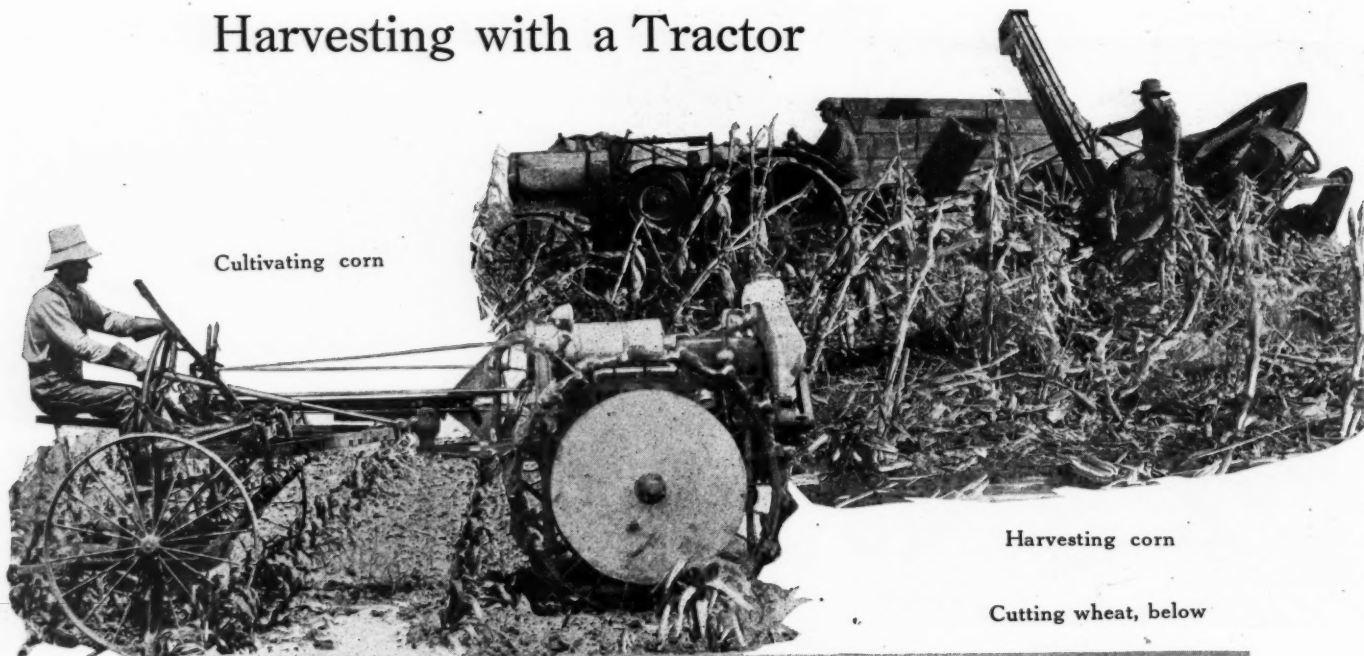
- Clearing the land;
- Preparing seed bed and seeding;
- Cultivating of growing crops;
- Harvesting;
- Belt work;
- Road work;
- Miscellaneous.

Clearing Land

Clearing the land consists of the preliminary operations necessary to prepare the land for subsequent cultivation and cropping. In prairie sections, and in parts of the country where the purpose is merely to bring more acres under the plow, this preliminary operation will consist principally of breaking the sod. However, there are parts of the country where more difficult operations are necessary. These consist of pulling trees, tearing out hedges, pulling stumps, and pulling out boulders.

These operations, with the exception of

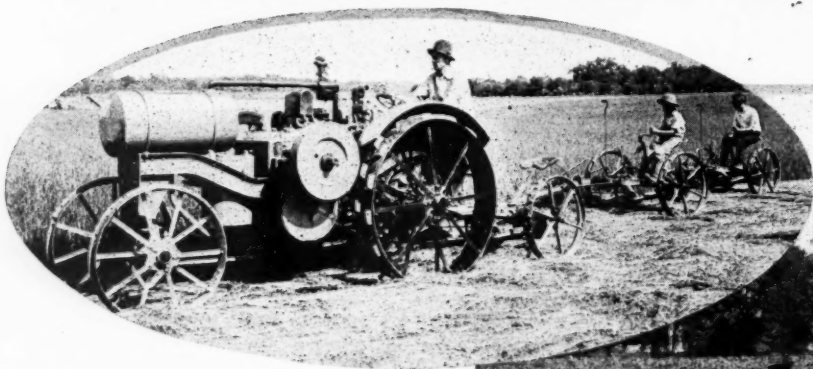
Harvesting with a Tractor



Cultivating corn

Harvesting corn

Cutting wheat, below



Mowing and loading hay



sod breaking, are for the most part occasional. In sections where timber land is being cleared, trees and stumps must be got out of the way and the tractor has been used very successfully in such work. Where it has been so employed it has obviated the necessity of buying more specialized machinery, such as stump pullers and the like. The power required will vary.

Clearing Chaparral

In parts of the country where it is necessary to clear away chaparral and undergrowth what has been accomplished by some of the more powerful tractors sounds incredible in the telling. In such work special grubbing bottoms are used. Tearing hedges and plowing up old fence rows is something which may present itself in any part of the country, and for such work the tractor appears to be admirably adapted. All across the country, almost from the

Atlantic ocean to westward of the Mississippi, there are remains of terminal moraines, characterized by the presence of boulders which under horse conditions presented obstacles to clean agriculture. By utilizing the power of the tractor in tearing these loose and removing them many a field has been cleared of obstructions to the plow. As a matter of fact, the tractor

is a means in the hands of the determined farmer with which he is enabled to do hard and difficult land clearing work with ease and dispatch.

The work of the tractor in preparing the seed bed is common to all sections of the country and the possibilities of the machine in such work are most generally understood and appreciated.

Compulsory Restrictions Forestalled

N. A. D. A. Tells How Association Is Taking Lead in Showing Patriotism of Dealers

ST. LOUIS, Mo., July 19—Scores of inquiries are received at President F. U. A. Vesper's office asking, "Where did the N. A. D. A. get the authority to tell me to close my shop?"

Other service shop owners are openly rebellious. A Shreveport, La., dealer advertised that "no one could make him close his shop," but he added "the government can have the shop if it needs it." Usually the spirit is not one of open rebellion but arises from a feeling that the owners' rights are being ignored and that someone behind the plan has selfish reasons. Answering these letters and telephone calls has become a burden and President Vesper has drafted the following communication which is being sent to any inquirers. It recites the history of the movement and gives the reason. The communication follows:

"In carrying out the suggestions of the War Service Committee it sometimes develops that, because of misconception of its situation, the local committees meet with a number of unexpected petty objections. Among those who are looking for some justification for refusing to comply with the War Service suggestions, the most prominent are those who insist upon an absolute order from the Government as evidence that the suggestions in question are authentic and in conformity with Government desires.

Origin of Movement

"For the benefit of those the National Association gives the following information so that no misunderstanding will exist:

"At the time War Service Committees representing the industries of the United States were formed in Washington, it was thought important that one committee represent the automobile dealers of the United States and accordingly a committee of fourteen members was appointed comprising what was considered the most intelligent and active dealers in the country.

"This committee was formed, became active and made an exhaustive investigation to determine what could be done to con-

serve man power and material. After full consideration and careful investigation eight recommendations were submitted by the committee in question to the Commercial Economy Board, who upon thorough analysis of same approved each and every suggestion in question.

"It was next decided by the Commercial Economy Board that the best possible medium through which to carry out these recommendations in their National fulfillment was the National Automobile Dealers' Association and accordingly designated it for this duty, which it has unselfishly accepted as its contribution toward the winning of the war. Automobile dealers and all allied businesses are expected to act upon the suggestions in question in a thoroughly American manner.

"It might be mentioned at this time that the Commercial Economy Board has never yet found it necessary to issue drastic or explicit orders and has always met with splendid success under this policy. This is worthy of particular comment in view of the fact that there are over 100 industries which have undertaken conservation policies and not a single one has thus far failed to fully comply. It is, therefore, hoped by every thorough American automobile business man that it will not be necessary to issue any absolute order to this industry.

"IT WOULD GRIEVE EVERY DEALER OF CALIBER TO HAVE IT SAID THAT THE AUTOMOBILE MEN OF THE NATION WERE THE FIRST ONES TO MAKE IT NECESSARY TO ISSUE SUCH ORDERS. As further information to any who may be reluctant to cooperate in this patriotic and thoroughly American matter and in the uplifting of the dealer industry, the National Automobile Dealers' Association quote below excerpts of a letter received by President F. W. A. Vesper, St. Louis, from Melvin T. Copeland, Secretary Conservation Division, War Industries Board, Washington, D. C., dated July 6 as follows:

"We are in sympathy with the general

purpose of your program. We are very glad to have your committee go ahead and put this through as your contribution to the war—we rely upon trade committees and trade associations to furnish advice and suggestions regarding the practical methods of conservation and welcome their voluntary cooperation in carrying out the program—YOUR PROGRAM WAS DRAWN UP AND GIVEN OUT BY YOUR COMMITTEE AT OUR SUGGESTION—we left it to you to be carried out on your own initiative—we have indicated our general interest and sympathy with what you are doing. We sincerely hope you will succeed in carrying out your program. We trust every automobile dealer will be ready to do everything he can in a practical way to help win the war. This is his duty and privilege as a citizen of the United States. IF IT APPEARS YOUR COMMITTEE IS GOING TO BE UNABLE TO PUT THROUGH THE PROGRAM THEY HAVE UNDERTAKEN WE SHALL HAVE TO CALL A CONFERENCE AND OPEN THE QUESTION WITH A VIEW OF MAKING NECESSARY INVESTIGATION AND DETERMINE WHAT ACTION TO TAKE. WE HOPE YOUR TRADE WILL BE ABLE TO ACCOMPLISH THE RESULTS WITHOUT DIRECT INTERVENTION BY THE GOVERNMENT."

Not Compulsory

"The National Automobile Dealers' Association is giving out this information to show that up to this time there has been no absolute or decisive order requiring the following out of the war service recommendations either in this industry or in any other, it has never been a matter of compulsion but simply a matter of patriotic effort on the part of the men in the trade for the honor of their industry. It would be a catastrophe, to say the least, were it found that it required positive orders before the automobile dealers would consent to take the steps so manifestly necessary to the conservation program in times like these and a shame not easily lived down."

Statement by Vesper in Regard to War Measures

THERE seems to be some mistaken conception regarding the night and Sunday closing recommendations made by the War Service Committee, particularly as applies to gasoline and supplies, indicating that the curtailment of the general use of motor cars is contemplated.

Use Is Encouraged

"Nothing is further from the facts, as the object of the suggestions is to foster and encourage the utility use of a motor car to the fullest extent and to cater to those who use cars for such purposes, but as night and Sunday usage of a motor car is mainly for pleasure purposes in the great majority of cases there is naturally a feeling that this can be reduced without any hardship on the part of the owner of a car and it is freely stated that other lines of business are freely curtailing the unnecessaries from same and it is therefore only equitable that the motor car industry do likewise.

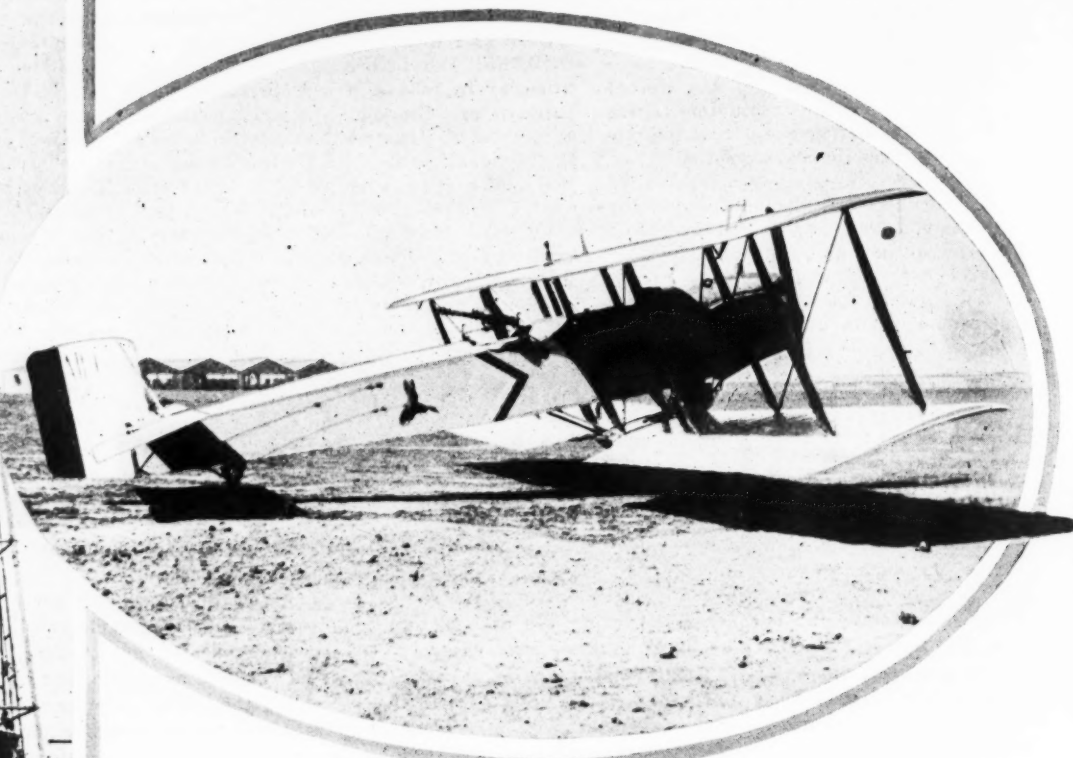
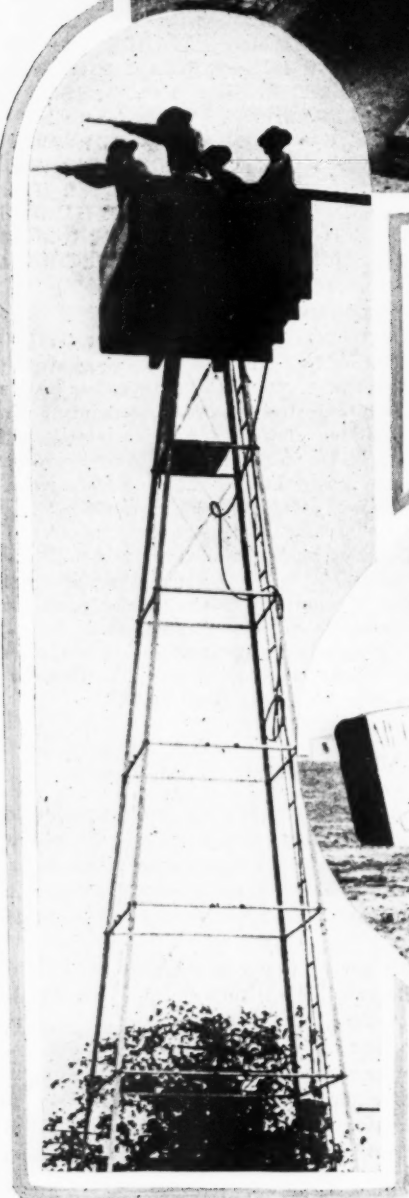
"The keeping open of service stations, oil and supply depots requires labor which is manifestly for the purpose of making it easier to obtain supplies admittedly for pleasure purposes and whatever small additional trouble it may be for the owner to obtain his supplies Saturday is so negative that no patriotic owner should object.

"A sensible reasonable use of the motor car on the part of owners and a reasonable sensible attitude on the part of the motor car dealer, garage man, supply depots and oil stations is an absolute assurance that no drastic order will be given regarding the use of motor cars or of gas or of oil and the probability of a 'seven motorless Sundays' edict or anything similar is very remote, as the closing movement on the part of the industry indicates very plainly it's sincere desire to help in every way possible to bring about speedy conclusion of the war."—President F. W. A. Vesper, N. A. D. A.

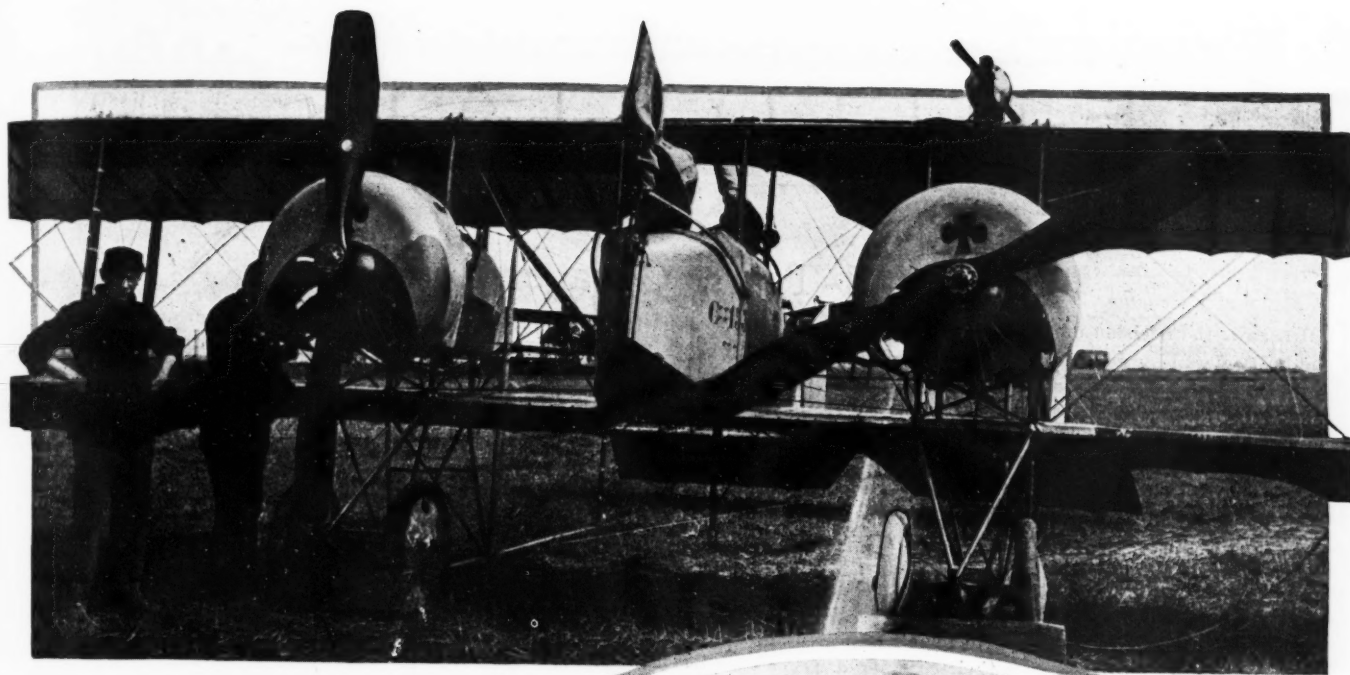


Fighting the Big Fight

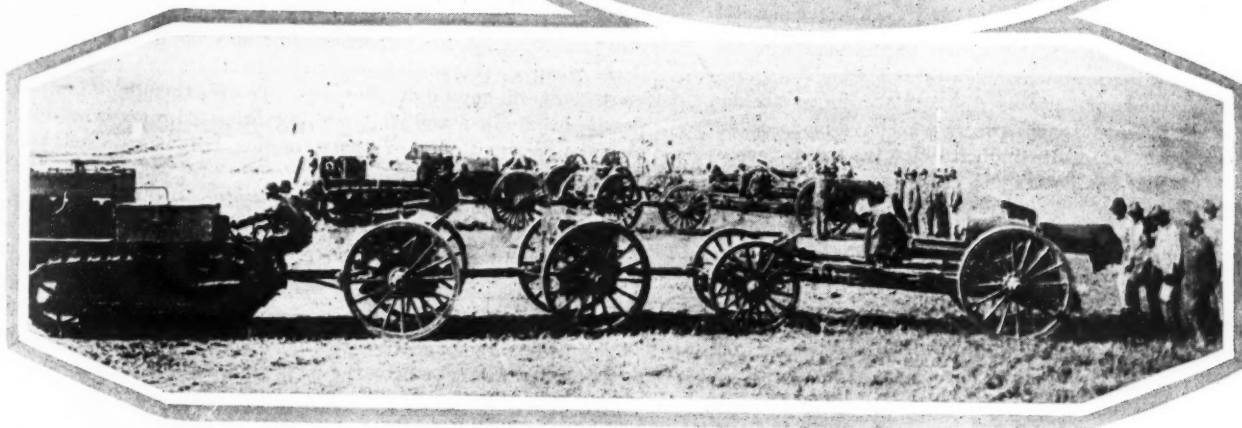
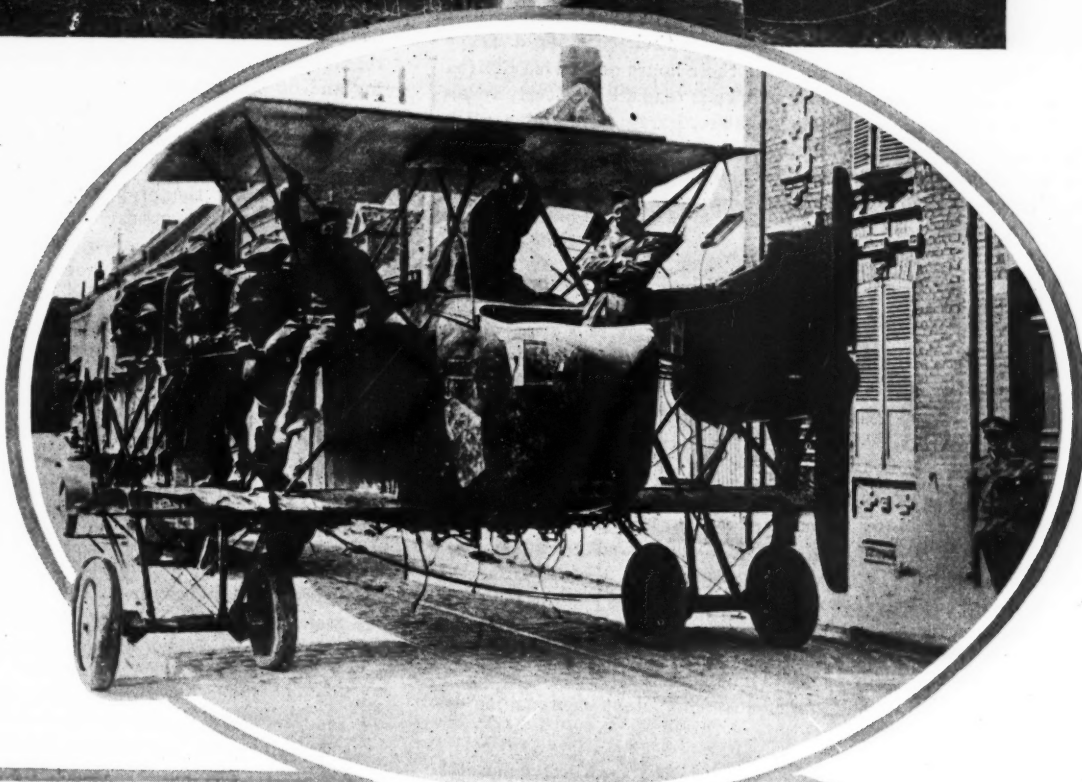
French mosquito tanks enroute to the front, above. American aviation students shooting at clay pigeons from aloft, in panel

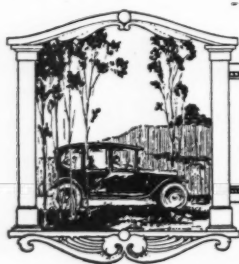


New type of airplane—the Dorand—for scouting at long distance. It carries three fighters and three machine guns

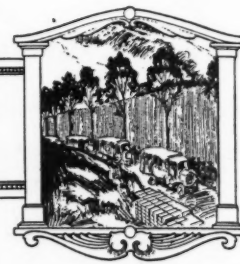


Above is a twin-engine Caudron bombing and reconnoitering plane equipped with wireless. The motor on top of the wing to right produces power for the wireless. In the oval is a giant German plane brought down by the British, while below tractors haul American heavy guns during maneuvers at Fort Sill, Oklahoma





EDITORIAL



The Small-Town Garageman

LAUDABLE as is the decision of the National Association of Automobile Dealers to urge that its members and all dealers and garagemen curtail service to owners, it appears that the strict application of the letter of the rules as laid down by that association in response to the request of the Federal Government will do injury without accomplishing the desired results in some instances. The particular feature of the curtailment rules which are objectionable is the setting of specific time when service must not be rendered.

IT is asked that dealers and garages do not give service on Sundays or in the evenings. Of course, the intent of the rule is to prevent service stations from having to remain open at all hours and every day and thus necessitate their carrying a larger force than would be necessary were their hours of service limited to some specified periods. The rule, as it reads, is perfectly feasible in most instances for city dealers, garagemen and service stations, but the peculiar conditions of the country garages are such that, if they are to close down during the evening and Sundays, in the language of one small-town garageman, "they might as well be closed all the time."

FOR the garageman in a small town, in this section of the country, at least, to refuse to give service in the evening and on Sunday would be to refuse almost completely to give service—at least, so far as the farmer is concerned. At this time of year, in particular, every farmer is working at top speed in the har-

vest. He cannot take the time from his fields during the daylight hours on week days to come into town for repairs for a car or truck that are not immediately necessary. He must bring his car or truck in after his day's work is done. Labor shortage on the farm makes this necessary.

IF the garageman in the country is to take care of his farm customers, which is his biggest trade, he must be prepared to make necessary repairs at a time when his customers can bring his vehicles in. This condition makes it necessary for the small town garageman to keep open every day, including Sundays and every evening. As a rule, the small amount of repairs and service required by the residents of the town and tourists is not sufficient to require a very large force week days through the regular working hours. When the farmer comes in in the evening and on Sunday the garageman's full force is necessary.

IT seems that a more general observance of the saving in service regulation would be brought about if it were generally made known by the proper authorities that the intent of the ruling is to conserve service labor and that the dealers and garagemen of any one town could be permitted to settle for themselves certain definite hours and days for no service.

THE small-town garageman is having enough difficulties as it is, without having him feel unpatriotic for running his repair shop at the hours it is needed most.

Lessons from Tractor Success

TRACTORS now are distributed so generally, territorially speaking, and are being used so successfully in so many different conditions and by men of such varied mechanical attainments, that it is possible to learn some lessons from the instances of success. The farmer who buys a tractor now can look to those who have shown special aptitude in tractor operation for instruction and guidance in order that he may himself become a better operator. The time is past when it is legitimate to cite the ill success of less competent men as an excuse for one's own shortcomings.

THE farmer who wants to improve his breeding methods goes to the successful breeder to learn, not to the man who has been a failure. The improvement of cultural methods is predicated upon the methods of farmers who actually have attained better results, not upon those of farmers who have made no advance. The man whose results indicate that no improvement has been made by him has nothing to teach.

IT should be just the same in tractor operation. No one presumes to say that tractor design and construction, and therefore tractor utility, have reached a climax. Both doubtless still fall far short of perfection. At the same time men succeed with present-day tractors. This is proof that other men may do as well, regardless of what opinion may be regarding tractor design.

IN this connection it is likely that the surest and quickest road to perfection in design and construction is by way of the experience of the men who are using present day tractors successfully and not by observing the experience of the men who fail. The tractor, imperfect as it may be, is able to justify itself when it is handled properly and there are men who do know how to handle it properly. Their example it is which should be studied and followed by other farmers who desire to make the most out of their tractors but who do not know just how to go about it.

Preparing the Seed Bed

ON the authority of a tractor dealer who is an ardent advocate of power farming methods, the improvement in crop appearance following tractor preparation of the seed bed is so marked as to be noticeable when seen side by side with crop appearances following old time horse methods of preparation. The dealer based his conclusion upon an instance where it happened that certain fields growing the same crops were partially prepared by the tractor and in part by horses.

MANUFACTURERS of and dealers in commercial fertilizer for years have based their claims favoring artificial fertilization upon comparative results. The same methods are applicable to tractor cultivation. If there is anything in the theory that tractor methods are better than horse methods it should reveal itself where results may be observed side by side. A body of competent observers only is needed. Such a body exists among the tractor dealers.

Wider Air Mail Service

Postoffice Will Take Exclusive Control Aug. 1 and Follow with Expansion

Lipsner to Superintend Work Throughout Country

WASHINGTON, July 20—Rapid expansion of the air mail service with eventual country-wide scope will begin Aug. 1, when the air mail service will pass from the War Department to exclusive postoffice control. College Park Aviation Field, 8 miles from Washington, has been selected as the new Washington terminal. Motor-cycle delivery will be made from that point to the city. Army aviators returning from the war will be given the preference in this service.

The first flight under the new system will begin Aug. 1, when it is possible that another reduction in service charges from 6 cents per ounce to 3 cents per ounce with the usual 10 cent special delivery charge will be announced.

It is also planned to shortly inaugurate an 8-hr. aerial mail route from Chicago to the east.

Capt. B. B. Lipsner, Chicago, has resigned his commission in the Army to become superintendent of the United States aerial mail service.

CHICAGO POLICE CLOSE SHOPS

Chicago, July 22—Enforced observance of the war economy measures adopted by the N. A. D. A. is contained in the ruling of Acting Chief of Police Alecock that all motor car salesrooms and repair shops must be closed Sundays and holidays and on week days at 6 o'clock. Chicago already had adopted the war measures, and in reality the police order does not do any more than insure observance of the war economy measures by occasional evaders. Garages where repairs are made may remain open on Sundays and holidays and after 6 on week days for the sale of tires and gasoline only, according to the police order. Repairs cannot be made after 6, though a garage car may send out a tow to fetch in a disabled car, which must not be repaired during any of the closed-down time.

TO MAKE ROYAL TRACTOR

Louisville, Ky., July 19—The Automotive Corp. has taken over the manufacture of the Royal tractor and will start active production immediately at Napoleon, Ohio. The tractor has two wheels and is driven by a pair of lines in the same manner that a team of horses or mules is drawn. It is mechanically steered, every operation of the machine being controlled by the two lines, such as turning, going forward or reverse, accelerating or retarding the speed. The tractor is listed at \$1,450 and weighs 3000 lb. Kerosene is used for fuel. The measure of speed is from 1½ to eight miles, and the machine will pull three 14-in. plows. According to the manufacturers, the tractor

can be attached to all present farm implements without any change.

This concern recently purchased the assets of the Sun Motor Car Co., Elkhart, Ind. The old armory is being used by the Automotive Corp. as a service department for Sun cars. It has been decided to move from Louisville to some other city, but no date has been fixed.

The concern is a Delaware corporation, of which George G. King of Chicago, is president; Robert Crawford, of Gary, Ind., formerly president of the Sun concern, vice-president; William Hulin, Louisville, formerly secretary and assistant treasurer of the Pan American Motors Corp., Decatur, Ill., secretary and treasurer, and C. W. Babcock, formerly connected with the Kelly-Springfield Co., Springfield, Ill., manager of the truck department.

GASOLINE IN N. Y. UP

New York, July 20—The price of gasoline has been advanced half a cent a gallon in New York and environs. Standard Oil wholesale will be 24½ cents a gallon, beginning to-day. Gulf Refining and Texas have made similar increases. Tidewater Oil Co. has not advanced the price yet, though an increase is expected by dealers.

NEW TRACTOR CONCERN FORMED

Galesburg, Ill., July 20—The Dependable Truck & Tractor Co. is the name of a new organization which will manufacture trucks and tractors in this city. The officers are: President, C. V. Morse; vice-president, H. C. Pfaff; secretary-treasurer, J. J. Welch. With the exception of Mr. Welch, who is an attorney of this city, all the members of the company until recently were associated with the Pan-American Corp., Decatur, Ill. Arrangements have been completed by which all of the castings required by the new concern will be made by the Decatur, Ill., Malleable Iron Works until a foundry can be established here.

WRIGHT-MARTIN WILL EXPAND

New York, July 20—The Plainfield, N. J., plant of the Bosch Magneto Co., which has been purchased by the Wright-Martin Aircraft Co., is to be occupied by the Wasson Piston Ring Co., which will remove its equipment from New Brunswick, N. J., and turn over its plant to the Wright-Martin company. This will give the Wright-Martin company an additional plant in New Brunswick and will permit considerable expansion. The company is at present producing about 500 engines a day in its New Brunswick plant and about forty engines a day in the Long Island City plant.

CHICAGO TO HAVE SHORT HEATS

Chicago, July 22—The International Sweepstakes at Speedway park next Sunday has been sanctioned by the A. A. A. as a class E, non-stop, special invitation, five-cornered match race. It will be run in four heats, the distances to be determined.

The contenders are Ralph de Palma, Louis Chevrolet, Ralph Mulford, Arthur Duray and Dario Resta. The management has posted \$15,000, and each driver will put up \$2,000 each, bringing the total to \$25,000 to be divided among the winners.

Truck Program Complete

White 1½-Tonner Replaces Standardized Army Model and Is Type A

Quantity to Be Ordered Is Unsettled So Far

WASHINGTON, July 19—The White 1½-ton truck, manufactured by the White Co., Cleveland, Ohio, will replace the original 1½-ton standardized Army truck, according to authoritative advice. This announcement definitely settles the standard Army truck program, which will include for the AA the G. M. C. ¾-ton truck, for the A the White 1½-ton truck, and for the B, the original B 3-ton heavy-duty war truck earlier known as the Liberty truck. It is understood that the White truck will be known as the A truck and will undergo certain changes in its specifications similar to those made in the AA and recently announced. No decision has been reached as to the quantity of the A truck to be ordered, and bids have not been requested of the manufacturers. Major Brown of the Motor Transport Service, who is in charge of this work, is making a trip through the middle West partly to determine the manufacturing possibilities for the A truck.

These decisions definitely settle the Army truck program and point to a victory on the part of those who were opposed to the original standardized truck plans. It will be recalled that earlier there was considerable opposition on the part of certain standard truck makers to the first scheme, whereby standard ¾-ton, 1½-ton and 3-ton trucks, designed by engineers called to Washington, were to form the bulwark of the United States Army Motor Transport Service. There was opposition created by some who felt that the original A and AA trucks were not mechanically correct, and by others who preferred to see their own trucks used by the Army. There was much feeling displayed on both sides for a time. The disagreement resulted in a reorganization of the Motor Transport Section into the new Motor Transport Service under Col. Frederick Glover, and in a series of tests ordered by Secretary of War Baker. It is said that the selection of the G. M. C., the White and the original B trucks are the result of these tests, although parties on each side of the controversy claim that the tests were not complete enough or of long enough duration to secure adequate results. The claim is made that no make of truck can be judged by the performance of one or two models of the type.

MARINE CONTRACTS PLACED

Washington, July 19—The following are contracts placed by the Marine Corps:

Studebaker Corp. of America, New York, trucks.

Ford Motor Co., Detroit, chassis.

Firestone Tire & Rubber Co., Philadelphia, Pa., tires.

The Goodyear Tire & Rubber Co., Akron, Ohio, tires and tubes.

May Be More Than 25 Per Cent Cars

Coal Curtailment Does Not Mean Production Will Be Reduced Three-fourths

Manufacturers engaged solely in non-war work can learn their position for the 1918-1919 period by checking up the coal requirements for the 1917-1918 period and allowing 25 per cent of that amount for the 1918-1919 period. Manufacturers engaged in non-war work and war work will be expected to observe the following plans:

1—Estimate accurately the average amount of coal per piece produced required for heat and power, basing these figures on the 1917-1918 period.

2—Estimate accurately the total amount of coal required for the

period Aug. 1, 1917, to Aug. 1, 1918. Take 25 per cent of this as the coal allowance for non-war work for 1918-1919.

3—Estimate accurately the total amount of war work engaged in. Find the amount of coal required by using the coal per piece rate. Allow 100 per cent coal requirement for the war work.

4—Order 25 per cent of coal for the non-war work. Order 100 per cent coal necessary for the war work. This will be the total coal allowance from the United States Fuel Administration.

THE coal curtailment will not reduce car production 75 per cent. Though the Fuel Administration probably will require a 75 per cent reduction in coal consumption, if a manufacturer of passenger cars or parts reduces his consumption 75 per cent but discovers an honest method of maintaining production at 50 per cent of the 1917-1918 period, it will approve such actions.

The Fuel Administration is in favor of the greatest production of passenger cars possible with the 75 per cent coal reduction. The coal allowance to passenger car and parts makers will not be estimated by enforcing a curtailment in the number of passenger cars or parts. It will be estimated by taking the requirements of 1917-1918 non-war work and cutting it 75 per cent, allowing 25 per cent of the coal consumption last year for non-war work for the 1918-1919 period. It will apply only to passenger cars, as truck, tractors and the parts for these are considered as war work by the Fuel Administration.

To ascertain the proper amount of coal to be used for non-war work manufacturers will be expected to estimate accurately the coal consumption for the 1917-1918 period. They will be expected to deduct 75 per cent from this and use the remainder as a guide for their 1918-1919 requirements. They will be allowed 100 per cent coal for war work. They will not be allowed to use more than 25 per cent of the coal they have for non-war work regardless of the amount of coal they may have on hand.

Can Prevent Use

While it is doubtful if the Fuel Administration has the power to take the surplus coal away from an owner, it has the power through the Lever Act to prevent the owner of that coal from consuming more than the amount prescribed by the Administration regulations.

The figures "25 per cent" are approximate, as the Fuel Administration has not decided upon the actual allowance of coal.

Dr. Harry Garfield has indicated that it will probably be 25 per cent of the 1917-1918 requirement for the 1918-1919 period.

The entire matter is as yet somewhat vague in the minds of the Fuel Administration. It is not certain of the exact percentage curtailment nor of the methods of procedure in special cases. It does not know, for instance, what would be done in the instance of a manufacturer of parts

who in 1917-1918 not only supplied passenger cars made during that period but millions of passengers cars made in previous years.

Following is an example of how the manufacturer can approximately ascertain his coal allowance for the 1918-1919 period:

A. B. & Co. manufactured 3000 passenger cars Aug. 1, 1917-Aug. 1, 1918.

A. B. & Co. consumed 3000 tons of coal Aug. 1, 1917-Aug. 1, 1918.

A. B. & Co. have war contracts for 1300 passenger cars or for other materials using 50 per cent of its plant.

The U. S. Fuel Administration allows:

One hundred per cent coal requirements for the war work for 1918-1919.

Twenty-five per cent of the 1917-1918 coal used in 1918-1919.

Using 3000 tons of coal for 3000 passenger cars, A. B. & Co. average 1 ton of coal per car.

Being allowed 100 per cent coal for war work, it orders for war work: 1500 tons

(war car order or 50 per cent of last year's consumption to meet the 50 per cent war work in their plant).

Being allowed 25 per cent of the coal consumed in 1917-1918 for non-war work, it orders for non-war work: 750 tons of coal, which is 25 per cent of the 1917-1918 consumption. Thus the complete order is: 1500 tons for war work, 750 tons for non-war work, 2250 total allowed for war and non-war work, which is 75 per cent of the 1917-1918 coal.

M. A. M. A. FOR AIRPLANE SHOW

New York, July 20—At the quarterly board meeting of the Motor and Accessory Manufacturers' Association it was decided that this body will support an airplane show if such is permitted to be held by the War Department. The show committee of the association was instructed to make its usual contracts with the National Automobile Chamber of Commerce covering both the New York and Chicago shows. E. W. Beach resigned as a member of the executive committee because of his affiliation with the Bureau of Aircraft Production in Washington but will remain a member of the board of directors. His place on the executive committee will be taken by William M. Sweet. One new member, the Sewell Cushion Wheel Co., Detroit, was elected for membership.

MICHIGAN HAS RURAL EXPRESS

Lansing, Mich., July 19—Michigan is to have rural express. One Lansing company which owns several motor trucks has informed Secretary Wickham of the Michigan Highways Transport Committee that its trucks are available, and plans have been perfected by the traffic department of the Flint board of commerce whereby this city will become the center of a large



Lieut. Quentin Roosevelt, youngest son of Col. Theodore Roosevelt, in his airplane just before he made his first official flight in France. Lieutenant Roosevelt was shot down in aerial battle July 14, when he engaged two out of seven pursued German machines. He had brought down his first enemy airplane four days earlier. Quentin was one of the four sons, all in army service, and was twenty years old. German aviators have confirmed the reports of his death

transportation organization providing truck freight service for all of this section of the state. The first trucks to start out loaded in this new system left Detroit yesterday and will return with freight for Detroit to-morrow. Early next week freight service will start between Flint, Saginaw, Bay City and Alma, and at the same time truck service will start between Flint and Owosso, and Flint and Lansing.

Four trucking companies have been brought together in this new system, which will practically work as one unit, with an interchange of freight service, so that through shipments may be made from any point to another. The towns to be served include Ann Arbor and intermediate points between that city and Pontiac, where transfers will be made on the Detroit-Flint line, Holly, Fenton, Linden, Mount Morris, Clio, Birch Run, Saginaw, Bridgeport, Frankensmouth, Bay City, Alma, Owosso, Corunna, Lansing, Fowlerville, Durand and smaller towns.

CHARGES AGAINST GOODYEAR

Washington, July 22—Charges of unfair competition have been made against the Goodyear Tire & Rubber Co. by the Federal Trade Commission. Among other things, the complaint alleges attempts to mislead the public in the nation-wide advertising of service stations, that the stations are not maintained by the defendant but that the service is dependent on the individual dealer and that such service commonly is furnished by dealers regardless of the make of tire used by the customer.

F. A. Seiberling, president and general manager, stated when interviewed by a MOTOR AGE representative, that the entire matter has arisen from a policy in effect with Goodyear dealers for over a year. This policy is to have dealers check the mileage obtained by customers and to take care of them on an adjustment basis. Dealers who have not lived up to the Goodyear strict service policy have been dropped and this has caused dissatisfaction, which has led to the charges, in Mr. Seiberling's opinion.

May Have Salina Twilight Tests

SALINA, Kan., July 20—The management of the National Tractor Demonstrations is endeavoring to obtain additional acreage for a twilight demonstration from 8 to 10 p. m. for the benefit of farmers and others who feel it impossible to leave their business during the day. Many tractor makers have light equipment whereby their machines can plow 24 hr. a day, it is claimed, and requests for the use of same have been made to headquarters.

The Hyatt Roller Bearing Co., Chicago, has been selected as official to determine drawbar tests of tractors at the demonstrations. This concern has been making tests for the last six years and will have special machines for Salina. C. M. Eason, general manager of the tractor division, will be here this week to take direct charge. Others from the factory in New Jersey and branches in Detroit and Chicago will cooperate with the agricultural engineers in making dynamometer tests.

Industry Will Make Steel Inventory

War Board Is Expected to Decide on Shipments After Examination of Stock

WASHINGTON, July 19—As a result of the conference between Hugh Chalmers, representing the passenger car makers, and the War Industries Board on steel for passenger cars a complete inventory showing the number of partly complete cars and parts, as well as the steel on hand for passenger cars and parts, has been asked.

It probably will require two or three weeks to file the inventories, and meanwhile nothing can be done on the steel situation. The inventories are expected to show that the industry has not received steel on a basis of the 30 per cent reduction agreed on between the War Industries Board and the industry some months ago, which agreement was to continue until Aug. 31, 1918. It also is expected that these inventories will show unbalanced stocks in many factories, which will call for reasonable shipments of certain kinds of steel to complete the production of certain numbers of cars.

It is expected that the War Industries Board will announce its decision concerning further shipments of steel to the industry after a thorough examination of these inventories.

There seems to have been some counter-opinions concerning the steel the industry has been using for some months. The makers have been operating on a 30 per cent curtailment, but it is stated that since the 30 per cent agreement was entered into there have been later rulings on steel distribution and that the industry has not been receiving this allotment of steel.

Mr. Chalmers asked the War Industries Board for a 60 per cent allotment of steel as compared with the 70 per cent allotment which the industry is operating under at present. No definite information could be given on such a request and nothing will be

forthcoming until the inventories have been examined.

It has been known for some time that considerable inconvenience has been caused by the unbalanced inventories and several factories have received good co-operation in securing quantities of steel in which they were lacking and by which they have been able to carry on production that would otherwise have been impossible.

During the last week the steel manufacturers have met with representatives of the War Industries Board for a general survey of steel requirements. It seems utterly impossible to get a complete budget of the requirements of the Government. New shipbuilding yards are being erected and it is impossible to estimate their requirements. The amount of ship tonnage which it is possible to build this year is being cut down and now the steel makers feel that a sane estimate of the Government's requirements will soon be available.

PRODUCTION IS CUT

Detroit, July 19—The critical steel situation is causing a cut in passenger car production in this territory and there is a difference of opinion as to just how long this will last. Comparing production figures of May with those of to-day the average reduction in output of passenger car manufacturers would be approximately 33½ per cent.

Several manufacturers, however, have not felt the necessity of decreasing their output and have been maintaining the same production since May. Among these are Packard, Overland and Hupp. Hupp shipped 1053 cars during June.

CHALMERS AND MAXWELL DEALERS

Detroit, July 22—Contrary to reports the Maxwell Motor Sales Corp. is not making a general practice of combining Maxwell and Chalmers agencies. In a few instances the company has found it advisable to combine the field forces of the two lines and it has become a general impression that the company has been doing this all over the country. This is positively denied by the company. It states that the dealers are not being disturbed in the least. Each agency is handling its respective line as heretofore. Not over six instances are on record within the last six months where a combination has been effected.

ALL CADILLACS FOR WAR

Detroit, July 23—Special telegram—Cadillac production will be curtailed Aug. 1 to such a degree that the entire output will go to Government uses. The present daily production is forty cars. Twenty-five go to various departments of military service. When the decrease takes place it will mean that no cars will go into the commercial field. This is not a permanent arrangement, however. As soon as the steel situation is cleared, commercial production will be resumed.

The drawbar and brake tests will be under the direction of Professor Sjogren, head of the farm mechanics department of the Nebraska College of Agriculture; C. K. Shedd, College of Agriculture of Iowa; F. M. White, agricultural engineering editor of the National Farm Weekly; and J. B. Davidson, College of Agriculture of California. These will have a score or more assistants. Tests will show the cost of plowing per drawbar horsepower hour, per acres at given depth and under same conditions, etc.

Machines that are sold as gasoline will be operated on the same grade of gas as all other machines on the field so labeled. The tanks will be filled and sealed by the committee. Kerosene tractors will be sealed in the same way.

Makers of tractors will receive official records of their machines' performances signed by the committee, and their publication will be optional with the makers.

Chevrolet Wins Derby at Uniontown

Time for 112½ Miles Is 95 m. p. h.—
Toft Is Second and Hearne Third

UNIONTOWN, Pa., July 18.—The policy of Louis Chevrolet never to accept defeat until the checkered flag has been dropped before another driver, coupled with spectacular driving against handicaps, won for him the 112½-mile Independence Derby on the Uniontown speedway here this afternoon. Twice he was forced to the rear when tire changes cut in his time, but each time he forged ahead and had a clear lap ahead of the field in anticipation of more misfortune when he took the last lap, pounding home a full minute ahead of Omar Toft, who came in for second money. Eddie Hearne, Ralph Mulford and Tommy Milton finished in the order named and Barney Oldfield was given sixth position, being checkered off in his ninety-sixth lap when he was driving a solo around the wooden saucer. Chevrolet's time was 1:11:22.45, at an average of 95 m. p. h.

Hearne Loses Second

Second money was snatched from Eddie Hearne's grasp in his last lap when his Dusenbergs kicked off a shoe beside the grandstand negotiating some maneuvers which had all the earmarks of a bad spill. So well did the Chicago driver have his steed in hand that he dropped into the pits without an accident, although a collision with Omar Toft, who was riding Eddie hard for second place, narrowly was averted. A quick tire change was effected in the pits and Hearne completed the last lap for an easy third place.

In the seventy-sixth lap of a race which had been heartbreaking for Chevrolet's followers, the Frenchman lost his jinx and had everything his own way, easily holding the lead for the remainder of the grind. He led the field at the start, but lost a lap and a half in the twenty-sixth round when a front tire dropped. He re-entered the race at the bottom of the ladder but rapidly forged ahead and was setting the pace in the sixty-eighth when misfortune again overtook him. For three laps he held the course with a front tire in shreds, but finally was forced to capitulate to the pits and again take a tail end position.

Twelve thousand persons witnessed the afternoon's racing program under excellent weather conditions.

Hearne, Oldfield and George Gardner provided the afternoon's thrills. In the tenth lap Barney's dismantled Golden submarine lost a tire while he was hovering near the rim of the saucer on one of the curves. The machine shot for the lower rim, but Barney remained its master and limped into the pits on the succeeding lap. On the preliminary lap for the main event George Gardner's Hudson became bunched with the machines driven by Fred McCarthy and DeLloyd Thompson. All three cars bumped together but Gardner, to avoid a bad spill, sent his machine through the lower guard rail, effectively putting him out of the running when it overturned. McCarthy's O. & B. special also was scratched.

Arthur Duray made his bow before the

local speed fans but through no fault of his own was unable to make a good showing. Entered in a match race with Oldfield, the new driver was forced to retire in the third lap with a broken magneto. The machine was adjusted temporarily by Louis Chevrolet between races but did not figure as a contender, numerous stops being made at the pits for adjustments. Duray definitely retired in the sixty-fourth lap.

Pitmen had an unusually lively day, the races throughout being marked by the number of stops, blown tires being responsible for all but a few of the halts. Eddie Hearne had driven a non-stop race until the last lap, but he then joined forces with the equally unfortunate drivers in hauling into the pits.

Breaks of the racing game were against the five-lap speed dashes and only in the Hearne-Mulford race was a real contest developed, the former crossing the tape a few feet ahead of Mulford, the distance representing ½ sec. The Peerless special driven by I. P. Fetterman backfired and was greatly damaged in the resultant blaze as it was drawn up to the scratch for the Australian pursuit race. Denny Hickey annexed that contest, in which Omar Toft and Milt McBride also participated. Louis Chevrolet had no difficulty in besting Tommy Milton in a five-lap dash.

Uniontown Results

INDEPENDENCE AUTO DERBY (In Order of Finish)

(100 Laps—112½ miles)

Driver	Car	Time
L. Chevrolet, Frontenac...		1:11:22.45
Omar Toft, Miller Special...		1:12:37.78
Eddie Hearne, Dusenbergs...		1:13:08.67
Ralph Mulford, Frontenac...		1:15:16.37
Tommy Milton, Dusenbergs...		1:19:16.66
Barney Oldfield, Submarine		

INTERNATIONAL MATCH RACE

(5 Laps—5½ Miles)

Barney Oldfield, Submarine...	3:20
Arthur Duray, Frontenac...	

CHEVROLET-MILTON RACE

(5 Laps—5½ Miles)

Louis Chevrolet, Frontenac...	3:17.6
Tommy Milton, Dusenbergs...	

MULFORD-HEARNE RACE

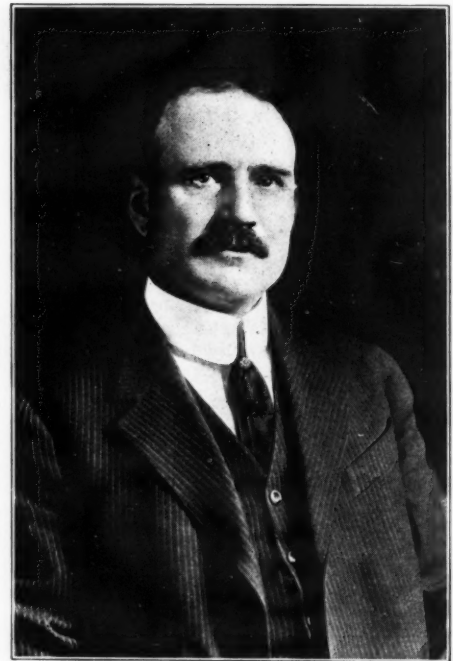
(5 Laps—5½ Miles)

Eddie Hearne, Dusenbergs...	3:35.56
Ralph Mulford, Frontenac...	3:35.76

AUSTRALIAN PURSUIT RACE

(16 Laps—18 Miles)

Denny Hickey, Hudson Special...	17:16
Omar Toft, Miller Special...	
Milt McBride, Comet Special...	



C. W. Nash Takes Charge of Aircraft Engineering and Production

WASHINGTON, July 19.—C. W. Nash, president of the Nash Motors Co., Kenosha, Wis., formerly president of the General Motors Co., has been appointed to take charge of engineering and production of aircraft and assumed his duties yesterday. Mr. Nash has resigned his active connection with the Nash Motors Co. for the period of the war and will act as assistant to John D. Ryan, director of aircraft production.

It is hoped that in his new field in charge of engineering and production for aircraft engines, as well as planes, that Mr. Nash will be given an office and his organization located at some city in the aircraft manufacturing zone. Just as Charles M. Schwab located the construction end of the Shipping Board in Philadelphia, so the engineering and production end of the aircraft program should be located in some city which would serve as the center of aircraft engineering, research engineering, and be a large production center as well.

Mr. Nash is one of the best known production executives in the country. From the time he went with the General Motors in 1910 up to the present time, production has been one of his greatest objectives. His accomplishment in the Nash Motor Co. in the short time he has had control of that organization gives indication of what may be expected in the airplane program. Since taking over the Jeffery factory it has been entirely reorganized on a production basis. Practically every department has been reorganized and practically every piece of machinery repositioned on a production basis. As a production executive Mr. Nash is one of those executives who goes through a factory every day and is directly familiar with every phase of the work. He gets his production information and makes his production studies first hand.

Reasonable Steel Supply Is Assured Truck Makers

WASHINGTON, July 20—Motor truck makers are assured a reasonable supply of steel for manufacture of parts and trucks both for war and general essential purposes, as a result of a meeting yesterday between the national motor truck committee, National Automobile Chamber of Commerce, and the priority committee of the War Industries Board. The meeting was granted following presentation of a written statement by the truck committee to the priority committee. Displaying a broad and comprehensive view of the utility of motor trucks, the priority committee, headed by Judge Edwin B. Parker, informed the truck committee, headed by George M. Graham, chairman, that trucks are considered vital commodities in the main and that **THE NECESSARY STEEL WILL BE FOUND FOR THE INDUSTRY PROVIDED:**

MOTOR TRUCK MAKERS AND AGENTS USE EVERY FACILITY FOR ENCOURAGING THE WIDEST POSSIBLE PROPER USE OF TRUCKS DURING THE WAR.

MOTOR TRUCK MAKERS WILL COMPLY WITH A LIST OF ESSENTIAL TRUCK USERS IN MAKING FUTURE SALES.

MOTOR TRUCK MAKERS AND AGENTS WILL WORK FOR THE STRICTEST CONSERVATION OF THOSE TRUCKS NOW IN THE HANDS OF CONSUMERS BY URGING THEIR REPAIR AND MAINTENANCE SO LONG AS POSSIBLE BEFORE REPLACEMENT BY NEW TRUCKS. OWNERS AND OPERATORS WILL BE REQUESTED TO REPAIR AND USE THE OLD TRUCKS, OPERATE THEM FULLY LOADED AND MAINTAIN SHIFTS OF DRIVERS TO SECURE THE GREATEST USE POSSIBLE PER DAY FROM EACH.

To Compile List

The list of essential users is to be compiled by Mr. Graham and C. C. Hanch, chief of the automotive section, War Industries Board, within the next ten days and later will be checked and completed by the priority committee. It will contain at the outset every kind of truck user. Those not considered essential will be eliminated. Since Mr. Graham filed a list yesterday showing that more than 80 per cent of the truck users now are using their trucks either directly or indirectly for war work with most of the remainder performing important general domestic business, it is expected that about 90 to 95 per cent of existing truck users will be considered essential and will be allowed to make further purchases and will be urged to further develop motor truck usage.

The written presentation sent to the priority committee recently follows. It tells of the shortage of steel now existing in all motor truck factories, of the utility of the

truck as a method of transportation for both general and war work, of the Government recognition of the truck as a mode of transportation for war materials, food produce and general express work.

Eighty per cent of existing trucks are used, says the presentation, for various kinds of work directly or indirectly connected with the war. These are tabulated with the percentages. Jan. 1, 1918, 400,000 trucks were used in this country, it is shown, with production indications for 1918 placed at 275,000 trucks, of which 50,000 go to Europe for war work; 40,000 replace others worn out in this country, making a total of 185,000 to go into domestic use. This insures approximately 585,000 trucks in use in this country for 1919, and the committee estimated that these individually will average 10 tons haul per day, or a total of 5,850,000 tons hauled daily by trucks. These figures impressed the priority committee considerably.

Mr. Graham further explained at the hearing allowed yesterday, which was attended by the priority committee, C. C. Hanch, and the truck committee, including George Graham, Pierce-Arrow Motor Car Co. and chairman; Windsor T. White, White Co.; M. L. Puleher, Federal Motor Truck Co.; David Ludlum, Autocar Co.; D. C. Fennér, International Motors Co.; S. A. Miles, N. A. C. C., and other points important to the request for steel.

In reply to requests from the priority committee, made earlier this week, the truck committee telegraphed all truck makers for information as to:

How many completed and unsold trucks for domestic use each has on hand at the factory or in branches or agencies?

How many trucks each can build from material at present on hand?

For how many trucks each will require material to fill the domestic program for the remaining months of 1918?

How many trucks were produced by years for 1916, 1917 and the first six months of 1918 for the United States and the Allies?

How many trucks were produced for domestic purposes in the same period?

How much steel the aggregate number of trucks produced in that period required.

How much rubber the total number of trucks produced in that period used.

How much coal was needed per plant per year?

What was work other than trucks manufacturing each plant was engaged in?

The passenger car business of each truck maker?

Inquiries for this information were sent to 144 firms and replies were classified into two series, those who made more than 100 trucks in the two and one-half-year period and those who made less than that number. It was found that 101 concerns made more than 100 trucks in the two and one-half years. These manufactured 276,477 trucks between Jan. 1, 1916, and June 30, 1918, for all purposes, war and otherwise. Figures revealed show that 276,477 trucks required 492,129 tons of steel and 48,537 tons of rubber.

These figures give the average of 1.7 tons of steel and 200 lb. of rubber per truck.

Thirteen thousands trucks, one month's supply, are all that the manufacturers have on hand either completed or which can be completed from the parts and material in stock. This small amount displayed to the Priority Board the need for prompt relief to the truck industry, provided it found the industry worthy.

Would Injure War Program

One of the most impressive statements by Mr. Graham was to the effect that elimination of trucks at this time would be seriously injurious to the railroads, war and every war requirement, which he backed up with a detailed account of the functions of the motor truck. He not only told how important these functions are but went into detail telling that trucks are being used for road work, cantonment provisioning, Government warehouses, Government and war housing building, by steel firms, express companies, oil companies, Army shoe makers, Army clothing and wool makers, food product concerns like the meat packers, dairy companies, electrical equipment makers, and for shells, Government furniture, feeding cantonments, farm product producers, tobacco growers and packers, coal mines, etc., and created a climax by telling that twenty-eight 5-ton Mack trucks were purchased this week by the Bureau of Mines which will deliver every ton of coal this next season to be used by the many Government buildings here. He enumerated more than 200 companies dealing in these commodities for war purposes that used thousands of the trucks.

Further Mr. Graham told that 900,000 tons of war and other important merchandise is being hauled yearly between Philadelphia and New York by motor trucks, considerably augmenting the railroads and actually preventing serious railroad con-

ARE YOU ONE OF THE "HICKS"

WHO STILL SAYS

"PLEASURE CAR"

WAKE UP!—SAY

"PASSENGER CAR"

DON'T BE A

RIP VAN WINKLE

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CHICAGO AUTOMOBILE TRADE ASS'N, CHICAGO, ILL.

gestion. He described the Akron to Boston route used by the Goodyear company.

Judge Parker told the serious need for steel for war work. He stated that the Government could use more steel than will be produced this year but that the War Industries Board realizes that certain industries must be properly supplied and, following Mr. Graham's discussion and questioning by each side, he agreed that the truck industry is performing exceedingly valuable work and should be given the necessary steel, even if taken from the steel supplies needed for other war work, to increase its value as a transportation medium.

Summed up briefly, he stated that steel would be insured to all truck manufactur-

ers both for manufacture of repair and spare parts and for the manufacture of the trucks demanded by the yearly program, on the condition that the truck makers will encourage proper use of trucks and will guarantee that all trucks sold will go to essential use. In consideration of the urgent Government demand for steel, and the fact that the steel for the truck industry virtually will come from the stocks designed for war purposes, the truck committee feels that the War Industries Board has displayed a comprehensive view of motor truck utility and has agreed to a broad and ample program for it.

As far as can now be gathered the "essential list" of truck users will include a

vast majority of existing consumers. Such concerns as department stores were mentioned and the priority committee, taking a reasonable view, admitted that while some of the commodities purchased should be carried home, many others such as furniture, which is to a great extent an essential commodity, could not be carried and could be handled best by motor trucks. It also was pointed out that in the case of a truck consumer who was in some such business as jewelry, and to some degree war work, such user, if not on the essential list, could arrange to purchase a truck demanded by his war work, by making application possibly to C. C. Hanch or to the priority committee as will be arranged later.

Presentation by N. A. C. C. to War Industries Board in Respect to Need of Truck Makers

WE BELIEVE THAT TRUCKS USED IN THIS COUNTRY ARE NECESSARY TO A SWIFT WINNING OF THE WAR. ON THIS BASIS ALONE WE ASK CONSIDERATION.

Careful analysis shows 101 motor truck manufacturers must between June 20, 1918, and Dec. 31, 1918, meet a demand for 103,961 trucks, exclusive of those classed as war orders. They have completed, or have on hand materials for, 13,044 trucks. This is a shade more than 12 per cent of the demand. The sales of one month will exhaust these 13,044 trucks.

Some makers have no steel whatever.

STEEL AND OTHER METALS MUST BE FOUND FOR THE MAKING OF MORE TRUCKS UNLESS THE NATION'S COMMERCE AND THE WAR PROGRAM ARE TO BE DENIED THE TRANSPORTATION HELP THE MOTOR TRUCK CAN GIVE.

Truck a Utility

The motor truck is solely a utility. In this presentation we ask to have it considered separately from the motor passenger car, which also is a highly important transportation medium, but not used exclusively for business.

There is a difference of opinion as to the number of passenger cars which should be built at this time; there can be no doubt as to the value of every possible motor truck in service.

The motor truck discharges no function of entertainment.

It furnishes transportation at a time when transportation is a vital material need.

It is our information that a decision has been reached as to how many freight cars and locomotives are to be built, and that steel has been found for them. We do not see why motor trucks should not be accorded the same rating and the same treatment.

It is conceded that during the war we must have production. The motor truck is inseparably related to distribution of this production.

Congested traffic constitutes a war problem.

Production cannot be brought up to its ultimate unless sources of communication are regular and rapid.

Insufficient transportation did more to retard the rapid and efficient entrance of the United States into the war than could a legion of Huns.

This was proved last winter when to get transportation for coal to send ships to Europe with urgently needed supplies, the Fuel Administrator found it necessary to stop all production for five days.

Present shortages of coal and steel result largely from transportation deficiencies.

There are three main sources of transportation, as follows:

- Railway.
- Steamboat.
- Motor Truck.

The enormous growth of business and the extraordinary volume of war haulage have virtually overwhelmed both railroad and steamboat facilities. Both have more freight than they can handle. Only transportation over the highways offers any considerable possibility of immediate relief.

Almost all trucks serve their war purpose at this time. This applies equally to trucks that are going to the European battlefronts, and to those that will be used in this country.

Many purveyors in war supplies have based their schedules of rapid delivery on the help of the motor truck.

We can furnish your committee instances in which the truck has rendered a four-way service in this work. Such trucks haul away the dirt excavated for the foundations of a new building. Then the trucks bring in material for constructing the building. Next they deliver raw material for making the product. Finally the truck completes its record of performance by carrying the finished articles to the point of delivery. Such trucks are just as valuable in handling war supplies as those used in France.

The United States Government has recognized the importance of the truck both for military and so-called domestic uses.

War Department Order No. 38 established the Motor Transport Service for war trucks. The Highways Transport Committee, serving as part of the National Council of Defense, was organized to divert all possible traffic to the highways.

Government trucks running from cities in the middle West to the seacoast are

constantly establishing the practicability of overland delivery by power vehicles.

The Department of Agriculture has encouraged the application of trucks to the moving of food.

The Fourth Assistant Postmaster-General is hauling farm products into the big cities distances of more than 100 miles by motor trucks. His program, presented in a bill now before Congress, calls for the eventual establishment of 5000 miles of new roads, which will be built from the profits of motor truck haulage of food to market.

Every truck put into service brings the manufacturer nearer his market, brings the farmer nearer the consumer, brings the finished war order nearer the shipping point, facilitates rapid filling of orders, supplies the equivalent of man power lost by withdrawal of soldiers, makes less serious the shortage of horses and restores gaps in organizations occasioned by deficiencies of labor, material and transportation.

Aid to Farmer

The farmer, dependent as much on rapid access to his market as on the productivity of his farm, finds the motor truck coming to his aid at a time when he cannot hire farm hands. A truck on a farm will replace from two to four men. It will carry twice the load in half the time. It will make available for other production five acres of land whose yearly crop is now required to feed a horse.

It has been estimated that in view of the greatly increased production of food stuffs, wheat, rye, barley, oats, corn, beef, pork, mutton, eggs, milk, poultry and fruit, that 2,000,000 trucks could profitably be used between farms and markets. Only 450,000 motor trucks are now available for all lines of business. This is only 25 per cent of what could be applied to farms alone.

The use of the truck in so-called rural motor express lines offers the best possible medium which farmers, truck growers and dairymen may get to their markets. The truck also is being used for the delivery of live stock to stock yards.

Some makers sell 60 per cent of their trucks to farmers.

Many trucks are carrying raw materials to factories. The absence of the service rendered

by these trucks would often mean that thousands of men would go idle for lack of the raw material on which they work. Some railroads have had to decree that goods consigned in less than carload lots cannot be delivered in any specified time. This ruling results from a shortage of rolling stock and equipment, and a general congestion in freight yards, terminal points and warehouses.

The facilities of express companies for general work have been very much limited through the necessity of using baggage and express cars in troop movement. Therefore the purveyor in food supplies has found himself hard pressed to get transportation. He is placing increased dependence on the motor truck.

The development of heavy haulage companies operating between big cities and sometimes covering as much as 150 miles in their regular routes is a significant development. The use of trucks in this kind of work is increasing by leaps and bounds, for the truck is superior for short haul work and in making stops en route. It can deliver supplies to the door of the consignee. It saves time and labor.

In many points it has been found necessary to place embargo on movement by rail of certain kinds of freight within certain zones. The result has been to divert this haulage to local transportation and transfer companies, the medium in almost every case being a truck.

All that has been gained by the application of these trucks will be lost if there is a shortage of trucks or of parts to keep present trucks in repair. There will be this shortage unless some immediate guarantee of material is given to the whole industry.

Our inquiries, based on a questionnaire sent to various manufacturers, show that about 80 per cent of the output of motor trucks is being used in war work or related war activities.

By war work is meant motor trucks sold to the United States or its Allies, to the Red Cross, to the Y. M. C. A., or for use in cantonments, hospitals, Government war buildings. In related war activities we include trucks used in the construction of shipbuilding plants, used in industrial plants where war materials are being made, used by manufacturers or merchants in hauling army supplies, used for motor express lines, including parcels post service, by farmers as motor omnibus or stage lines, together with their application to a variety of other uses relating to the war.

Few Not in War

This leaves a comparatively small percentage of trucks applied to unrelated war activities. Even this small percentage involves a service of practical utility and convenience.

In order to make this usefulness clear, we have analyzed the sales of a foremost motor truck manufacturer for the period of twelve months' business in the year 1917. The appended arrangement by percentages will show that virtually every activity therein represented has some relation to the war:

	PER CENT
Transfer and transportation.....	13.2
Grocers	8.8
Contractors	7.6
Oil and gas producers.....	14.3
Coal dealers.....	4.7
Building supplies.....	5.0
Tool and machinery manufactures.....	2.0
Lumber	3.5
Meat packers.....	2.7
Chemical manufacturers.....	1.3
Textile manufacturers.....	1.7
Public utility.....	2.3
Road building.....	.54
Iron and steel.....	2.0
Foundry and forging.....	1.5
Storage and warehouse.....	1.5
Milk	1.2
Farmers .....	.78
Ice .....	.93
Ammunitions .....	.39
Mining .....	.24
Stone	1.

Brick .....	.39
Gas producers.....	.83
Rubber .....	.73
Hardware .....	.98
Paper .....	.98
Paints .....	.88
Bakery .....	.88
Flour	1.2
Sugar .....	.83

On the first of January, 1918, there were 400,000 trucks in the United States. It would be better for this country were the number five times as great.

On the basis of the first three months' production, there are indications that 275,000 trucks will be produced in 1918. Fifty thousand of these will go into war use in Europe. Forty thousand will be used to replace trucks withdrawn by the law of wear and tear. This will mean not less than 185,000 trucks for domestic use.

The smallest of these trucks has a capacity of half a ton, the range progressing up to 10 tons with the aid of a trailer.

The potential haulage capacity of the 450,000 trucks now in use can readily be understood. Allowing an average of 10 tons a day per truck, an estimate which is small since many trucks in short haul work will move as much as 100 tons per day, we have a total of 4,500,000 tons of freight moved per day. Surely there can be no arguments in favor of restricting such a valuable service.

Any delay in obtaining motor truck materials will eliminate the manufacture of parts necessary to keep in repair trucks now in use.

This constitutes a serious problem, for there is constant need of replacement.

We genuinely believe that the need for trucks and for repair parts is so great that steel and other materials should be found for them, even though it has to be taken from some other items classed as war necessities.

It means little to get rapid motor truck movement of war supplies in Europe if similar rapid movement lack at home.

A way should be found to make the motor truck industry a definite allotment of a certain percentage of the steel in sight, even though it be necessary to curtail some other war programs. We believe there are others less immediately vital.

This recommendation is made with the full knowledge of its seriousness. It is based solely on our belief that trucks are important to the winning of the war, that the whole system of transportation in this country will be further handicapped unless they are supplied.

It is essential to make a prompt decision for the guidance of manufacturers.

It is necessary in the construction of motor trucks to plan ahead. Even material delivered at once cannot be converted into trucks in less than three or four months.

Under the present system nothing is definite. A manufacturer cannot lay out his program. He works out his requirement and places an order with the producer of steel. The latter declines to enter it on his books because he is prevented from so doing by regulations of the War Industries Board. Often 90 per cent of material may be available, but lack of the other 10 per cent delays production.

Therefore, valuable time is lost. Transporta-

CHICAGO GARAGE MEN IN UNION

Chicago, July 22—Garage repairmen, helpers, washers and polishers here have formed the American Unity Garage Union, the first of this kind in the city. The chief purpose will be to standardize the scale of wages and make six days the standard week of labor. Washers will ask for \$25 a week; polishers, \$22.50; floormen, \$20; and repairmen, 75 cents an hour. Under the union rules a day will consist of 9 hr. It is said that representatives of fifty garages attended the first meeting.

tion needs are constantly growing. Action should be taken so that the motor truck manufacturer may supply his share of that transportation.

We cannot think it is the purpose of the War Industries Board to allow this condition to continue.

It might be possible to work out an arrangement by which motor truck manufacturers would be permitted during the next twelve months to produce a certain number of trucks per month and to furnish replacement parts for trucks now in service. The allotment per month should be based on the sales of the last year.

Each concern would report the amount of material necessary for its production allotment.

Should the demand for any particular truck increase, this manufacturer could make application to be allowed to purchase an additional volume of material.

In order to present necessary data we have requested motor truck manufacturers, not only those included in the membership of the National Automobile Chamber of Commerce, but the unaffiliated as well, to answer these three questions:

1—How many completed and unsold trucks for domestic use have you at your factory or in the hands of your branches and agencies?

2—How many trucks can you build from the material at present on hand?

3—For how many trucks will you need material to fill your domestic program for the remaining months of 1918?

Please note attached a record of the answers. These show that the stock of trucks on hand, or the material with which to build trucks, is virtually depleted.

By a study of the data you will find that nearly every manufacturer of motor trucks needs material. His stock in hand has been depleted by large purchases for war uses and related war uses.

The National Automobile Chamber of Commerce maintains in Washington a resident motor truck committee composed as follows:

Windsor T. White, White Co.; M. L. Pulcher, Federal Motor Truck Co.; David Ludlum, Autocar Co.; D. C. Fenner, International Motors Co.; S. A. Miles, National Automobile Chamber of Commerce; George M. Graham, chairman, Pierce-Arrow Motor Car Co.

Investment in Industry

The National Motor Truck Committee is representative, since it speaks for the fifty-five principal manufacturers of motor trucks included in the membership of the N. A. C. C., as well as for many other companies not affiliated, but with whom it works in harmony and whose viewpoint it presents at this time.

In making our case we have dealt only with the utility of the motor truck. We might also with entire propriety have called to your attention the very large investment in the industry, the number of men it employs, and the hardship that will result from failure to get material to keep its plants active.

We are led to believe that for every 1,000,000 men sent to the war front, something between 30,000 and 50,000 trucks will be required.

It is also suggested that the United States government will eventually use a large number of trucks at home.

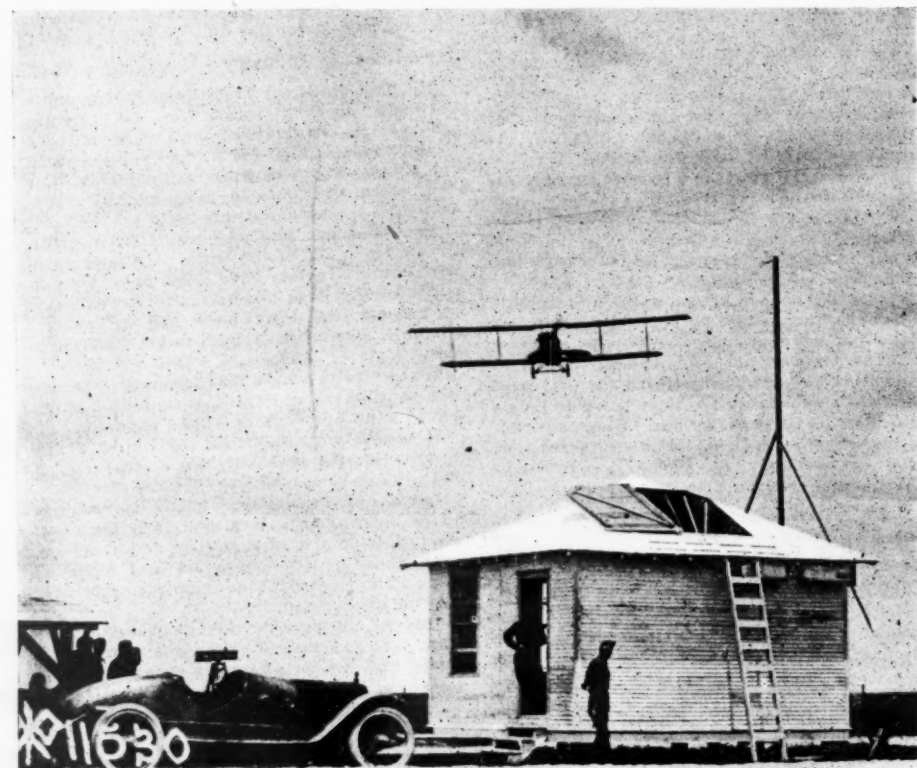
In order that motor truck plants may be kept up to their top efficiency, and their personnel maintained intact, so that they may meet any demands an enlarged program will make on them, it is necessary that these plants be kept alive in the interval.

This is only possible through domestic business. Not enough war work is in sight at this time. The domestic business is at hand and discharges a patriotic utility.

There seems, therefore, every reason why the War Industries Board should class motor trucks with such other transportation utilities as locomotive engines, freight cars and steamships find a means to issue the same priorities that go to war necessities, and see that the necessary materials are available in order that motor truck production be not interrupted.

Surprise Packages for Fritz

Bomb-Dropping from an Airplane



Preparatory bombing schoolhouse. The roof open to the sky is equipped with camera obscuras and Batchelor mirrors. The flyers are checked and traced on charts which quickly display their errors, below. An explosion of incendiary bomb from airplane is shown in the insert, while above bombs drop from a plane (Passed by Committee on Public Information)

GAS, smoke, incendiary, demolition and illuminating bombing exhibited in Washington at Congress Heights before important Allied and American officers recently, demonstrated the close relations between trench warfare and aviation. The exhibit was held by the trench warfare section of the engineering division of the Ordnance Department. The vast improvement in flares, bombs and devices for shooting these was displayed prominently. A De Havilland airplane equipped with two Liberty engines fired four demolition bombs of medium size from an altitude of 2000 ft., aiming at a target 30 ft. in diameter and striking within a radius of 200 yds. with each shot. Each bomb burst with a terrific concussion, tearing great holes in the ground, leaving craters 30 to 40 ft. in diameter. The bombs used in the exhibit were for demonstration purposes and but a fourth as effective as bombs used by the night-bombing airplanes, which comparison shows the havoc created by the normal bomb.

Smoke Hides Operations

Smoke bombs discharged from the plane burst, spreading a great pall of white smoke which combined with other clouds discharged by ground soldiers into a screen that filled the entire valley, completely hiding the operations of those on the other side. Gas bombs discharged clouds of gas fatal to any within inhaling distance. Incendiary bombs containing inflammatory material splashed the earth with flaming fragments starting huge fires almost as promptly as they exploded.

Nightfall developed a series of brilliantly lighted exhibits. Rockets were discharged which carried small parachutes and various colored lights high into the air. As the stick of the rocket broke from the stream of sparks the parachute on each opened and hung in the sky, displaying a small light with red, blue, yellow or green color. Each color has a meaning to the night bomber returning from or proceeding to a bombing expedition. Hand pistols known as very pistols also were exhibited. These are used both by aviators and by the soldiers in charge of the hangars and at the trenches. They discharge parachutes with different colored lights to a distance of 50 ft. and also are used for signaling at night.

Methods of illuminating hangars by night were displayed. A series of intensely bright lights are spread around the outer edge of the landing field, making it simple for the aviator to effect a landing. Another method of lighting up the field is by two flares, one at each end of the field, which develop a light so powerful that the observers of the exhibit, standing on a bluff 2500 yd. distant, plainly could discern every movement of the individual soldiers below.

A most interesting exhibit was the aerial flare bomb which is discharged by the night-bombing airplane to enable the aviator to see and select the objectives for his demolition bombs. This bomb 36 in. in length and 8 in. in diameter contains a parachute and material throwing an intense light.

The bomb is discharged at a high altitude and bursts at about 2000 ft., the parachute spreading over a 30-ft. radius with the light developing 350,000 cp. and illuminating a radius of 2 miles over the aviator's objectives. It is so arranged that the light neither blinds the aviator nor displays him to the enemy.

The display did not go into the 150 or more devices being produced by the trench warfare section, some of which are new and will be employed first against the enemy. Other exhibits included grenade barages, salvos of grenades, knapsack flame projectors and hand gas attacks.

It is said that the aviators now are equipped with three new devices on the airplanes, rendering their bombing considerably more effective. One includes a new method of aiming bombs with considerable accuracy, another measures the speed and altitude of the machine for the aviator with the third, the illuminating bomb mentioned before.

Night bombing is just becoming an efficient and effective war measure. There were no aerial bombing organizations in the Allied flying corps in the first year of the war when all planes were used for observation purposes only. Today 25 per cent of the aerial forces are bombing squadrons with twelve machines per squadron.

Originally the bombing, performed by volunteer pilots, was concentrated on camps and cantonments. Only three or four bombs were carried and dropped. They were made from artillery shells and seldom reached the mark. Occasionally showers of small steel arrows were spilled. The Germans, however, commenced day bombing of cities early in 1915. The Allies in a reprisal operated their first day-bombing expedition against Karlsruhe in October of the same year. Late in 1915 the French began night bombing, which was adopted by the Germans in August, 1916.

Over Hostile Territory

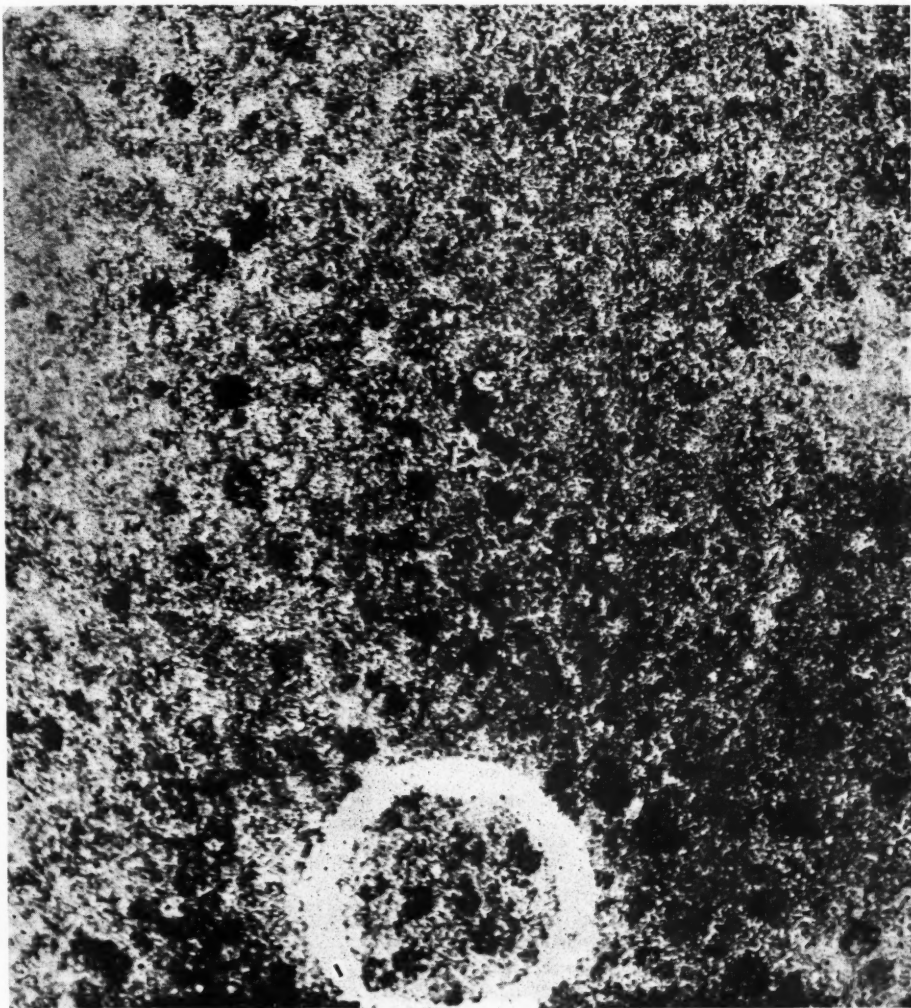
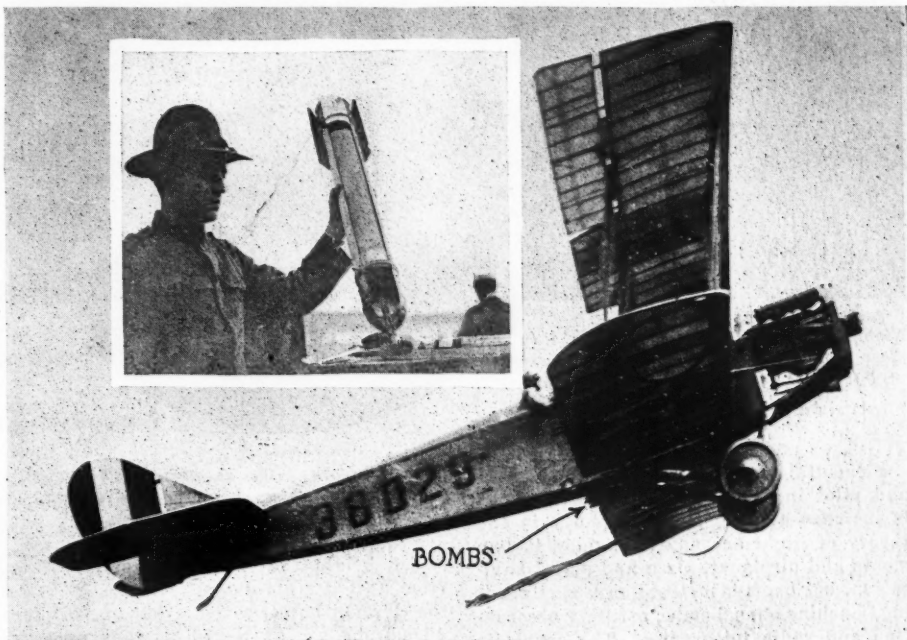
Today several squadrons of bombing machines go over the lines frequently and completely destroy their objectives. Unfortunately the Allied air forces have to travel over much hostile territory defended by anti-aircraft guns to attack German cities, while the enemy can attack French cities by short flights beyond our lines. To overcome this obstacle we are developing the huge Caproni, Handley-Page and De Havilland night-bombing planes, which will carry sufficient fuel for the long excursions and armament for protection. These bombing squadrons will be escorted by eighteen fighting planes over the enemy lines for protection against the enemy fighting planes after which they are left to their own devices, as the fighters do not carry sufficient fuel to accompany the bombers on the complete round trip. The bombing planes fly in similar formation to the fighting planes, in the form of a V, with the leading plane lowest and the following planes arranged in pairs on each side of the V and graduating in altitude with the last planes the highest, much like a flight of stairs. This permits the higher planes to pounce on enemy planes attacking the leaders below.

Bombing crews comprising a pilot and a bomber are given highly specialized training in flying, aiming, firing, navigating and

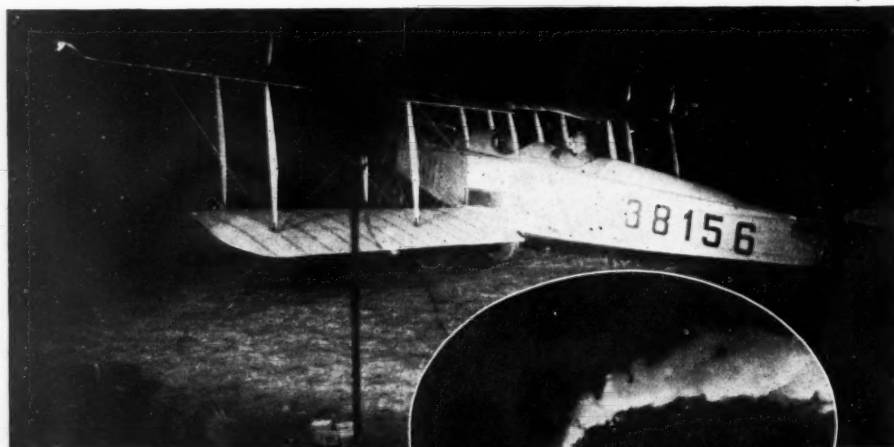
fighting. This training is essential else fliers traveling many miles over hazardous country would be likely to achieve their objective only to see the bombs discharged strike an open pasture, or they might lose their route and be obliged to descend in

enemy country or again they may be met in combat by enemy planes and consequently must be trained to meet all emergencies.

Shooting bombs is much like shooting a rifle. The sights and windage are set, the rifle held properly and the trigger pulled.



(Passed by Committee on Public Information)
Demolition bomb used by airplanes, insert. Bombs ready for release, just below the wings and connected at an angle from the body of the plane to the axle. Below, target circle



Night bomber with plane set, bombs in place ready for expedition. In the lower left corner are bombs and rockets

(Passed by Committee on Public Information)

Elemental training is given the bomber and pilot in a preliminary ground school. It includes a three months' course in the theory of flight aeronautic engines, instruments and airplanes, plain and aerial navigation, astronomy, meteorology, map reading, machine guns, bombs, artillery observation and radio telegraphy. The course is so complete that many of the students are able to build workable machines after completing it. It has been prophesied that after this war the country will be overrun with home-made airplanes constructed by the present students and graduates of the military aviation course.

Bombing Training Next

"Laying an egg on the Hun," which is the term for bombing, follows the preliminary training, when the graduates who stood highest are permitted to volunteer as bombers. They go to a bombing school, while the bombing pilots are sent to primary flying fields. The bombers thus advance more rapidly than the pilots as they, at the bombing school, meet pilots already trained with whom they will work. The pilots and the bombers are urged to cultivate each other to form congenial teams, adding efficiency in this way, since from this time on the team mates work, and sometimes die, together. In the preparatory bombing stage, the bombing crews fly over a course over camera obscuras and Batchelor mirrors located in houses on the ground. The houses are open to the sky and the course of the planes flying thus are checked and traced on charts and show the smallest errors of the flyers.

Bomb-dropping instruction follows, first from low altitudes, 3000 to 4000 ft. and then from higher points, 10,000 to 12,000 ft., as the aim of the bomber improves.

The target is usually a circle 25 ft. in radius painted on the ground, not hard to hit with a rifle at the distance but exceedingly difficult to strike from an airplane moving at 100 m.p.h. and far from steady. Well-trained bombers can score seven hits out of 10 shots, while some of the best marksmen do even better.

After the marksmanship is perfected the bombers usually fly at 10,000 ft. altitude, at

Night flare fully developed. The telegraph post shows how far into the sky the flare reaches

which height they are comparatively safe from anti-aircraft shots. Even a 4000 ft. the German batteries score but one hit for 10,000 shells. At 10,000 ft. they average less than one hit to every 50,000 shots.

JULY PRICE INCREASES

Chicago, July 22—Olympian has advanced its price from \$1,085 to \$1,240.

The Bartholomew Co. has made another increase in the price of Glide cars, the touring and roadster models going from \$1,595 to \$1,655.

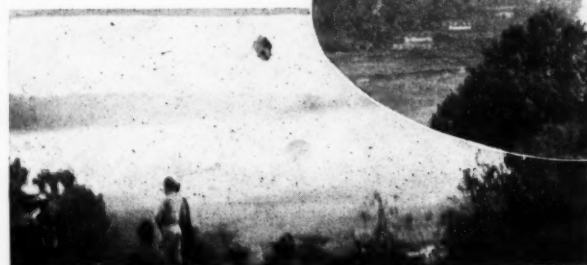
The 3½ and 5½-ton Sanford trucks advance Aug. 1 to \$3,975 and \$4,750, while the 2½-ton will be \$3,000.

Maibohm model B touring cars have increased to \$1,260.

Previous price increases are:

	New Price	Old Price
Hawkeye, 1½-ton	\$1,900	\$1,850
2-ton	2,500	2,250
Glide, light six, 5-pass.	1,595	1,495
4-pass.	1,595	1,495
Briscoe	885	825
Templar	2,185	2,085
Those reported last week are:		
Chandler, 4-pass., 2 door	\$1,795	\$1,595
4-pass., 4 door	1,875	1,675
7-pass.	1,795	1,585
Coupe	2,395	2,195
Sedan	2,495	2,295
Limousine	3,095	2,895

Below—Smoke screen caused by bombs from an airplane and ground soldiers



	New Price	Old Price
Cole, 2-pass.	2,595	2,395
4-pass.	2,595	2,395
7-pass.	2,595	2,395
Coupe	3,795	2,495
Sedan	3,595	2,795
Comet, 7-pass.	1,685	1,285
Cunningham, 142-in. wh'lbase	6,000	4,750
Kline, 2-pass.	1,595	1,495
4-pass.	1,595	1,495
5-pass.	1,595	1,495
Liberty, 2-pass.	1,485	1,385
4-pass.	1,485	1,385
5-pass.	1,485	1,385
Moon, 6-36, 5-pass.	1,395	1,295
4-pass.	2,250	1,985
5-pass.	2,250	1,985
Paterson, 4-pass.	1,495	1,295
7-pass.	1,495	1,295

Prices of all models made by Willys-Overland, Inc., advanced July 16, as follows:

Model	New Price	Old Price
90-T	\$ 895	\$ 850
90 Roadster	895	850
90 Country Club	925	875
90 Sedan	1,385	1,340
90 Panel delivery	895	865
90 Express delivery	875	840
85-4 Touring	1,025	965
85-4 Roadster	1,025	965
1200-lb. Delivery	1,075	975
85-6 Touring	1,300	1,195
85-6 Roadster	1,300	1,195
85-6 Coupe	1,550	1,420
85-6 Sedan	1,720	1,620
89-T Willys-Knight Six	1,525	1,450
89 Willys-Knight club r'dster	1,525	1,450
88-T Willys-Knight Four	1,650	1,625
88-4 Willys-Knight coupe	2,600*	2,275
88-4 Willys-Knight sedan	2,650*	2,325
88-4 Willys-Knight limousine	2,750*	2,425
88-8 Willys-Knight touring	2,500†	2,100
88-8 Willys-Knight limousine	3,300†	2,900
88-8 Willys-Knight coupe	3,175†	2,775
88-8 Willys-Knight Sedan	3,200	2,800

All Cadillac open cars are now \$3,220 instead of \$2,970; brougham five-passenger, \$4,090 instead of \$3,840; victoria, \$3,615 instead of \$3,365. The 125-in. chassis is \$2,690 instead of \$2,490; 132-in., \$2,770 instead of \$2,571; 145-in., \$2,810 instead of \$2,610. The town limousine is \$4,360; town landaulet, \$4,510; landaulet, \$4,495. The last three went up \$200. The limousine is \$4,395 now instead of \$4,145.

FORD TRACTOR ASSOCIATION

Dearborn, Mich., July 19—Distributors of Fordson tractors met in Des Moines, Iowa, July 10, to discuss future policies of distribution and decide the parts question. Representatives of forty-five states were present. All distributors agreed to sell parts at uniform prices regardless of the states in which they were located. As a result of this meeting the Ford Association was organized. C. L. Herring, Des Moines, was elected president; C. L. Flint, Providence, R. I., secretary; and C. H. Northway, New York, treasurer.



Above—Explosions of smoke bombs shot from an airplane

(Passed by Committee on Public Information)

Sixty Tractor Records

Show Ten Farmers Reduced
Hired Help and Sixteen
Replaced Horses

Depreciation Estimated as Largest
Cost Item

EARLY in 1917 the Division of Farm Mechanics, University of Illinois, sent to sixty tractor operators record sheets to enable the farmer to keep a yearly record of his tractor operations. When returned, twenty-two of these reports gave evidence of having been carefully kept, and a summary of the data collected is presented herewith.

It should be kept in mind that these data have been collected from a limited number of successful operators. In only one instance—tractors with kerosene-burning engines pulling three plows—is the number of operators reporting large enough to warrant the drawing of general conclusions. The remaining data will give some idea of what may be expected in other cases.

The sizes of the tractors used were as follows, according to horsepower: 6-12; 8-16; 10-20; 12-25; 20-40; 25-40.

Three Wanted Larger

Three of the users of 8-16 hp. machines desired a larger tractor. Three users of the 10-20 tractors believed a larger machine would be better adapted to their conditions. Only two men, one operating a 10-20 and the other a 20-40, desired smaller machines.

Of the machines represented, twenty-one had wheel drives and one had the track laying type of drive. Sixteen of the twenty-one wheel machines had two drive wheels. Of the five operators whose machines had other than the two-wheel drive, three expressed a preference for a four-wheeled machine with two drivers.

The hired help bill was reduced by ten farmers. The amount of reduction, when stated, varied from one-third to two-thirds of the previous help bill. One farmer operating 320 acres reported that he had been able to dispense entirely with the services of one man.

Ten operators reported no packing of the soil; six reported packing when the soil was wet; two reported packing of corn ground; three reported beneficial effects from packing, and one made no report on this question.

Practically all the machines were purchased at pre-war prices. Today the same machines would cost from 60 per cent to 100 per cent more, which would materially increase the depreciation charge.

The percentage of time-trouble is obtained by dividing the hours trouble by the hours used and multiplying by 100. The relatively large percentage of time-trouble reported for tractors with gasoline-burning motor engines pulling three plows is due almost entirely to one operator who used a tractor having a two-cycle engine. Omitting the report of this man the per cent time-trouble for this class of machines is 4.15.

The annual depreciation is estimated at 20 per cent of the original cost of the

tractor. This is a much discussed point and one about which authorities do not agree. It is believed the estimate used is in accord with the present experience of farmers. Under these conditions depreciation is the largest individual item of expense in connection with tractor operation.

The interest—6 per cent per annum—is estimated as follows: Add the original cost and the annual depreciation; divide this sum by two; and multiply the quotient by .06.

Fifteen of the twenty-two operators replaced one horse or more by the use of the tractor. These data indicate that on the average a man farms 22 crop acres per horse without the use of a tractor, and 29.7 crop acres per horse when the tractor is used.

Nine operators stated that the tractor enabled them to use either lighter horses, more brood mares or young horses.

OIL DIVISION WANTS INSPECTORS

Washington, July 18.—The Oil Division of the United States Fuel Administration is in need of combustion engineers. These engineers are desired to act as inspectors for each of the following districts: Boston, Providence, New York, Philadelphia, Pittsburgh, Buffalo, Detroit, Chicago, Minneapolis, Tulsa, New Orleans and San Francisco. The inspector for the Oil Division engineers will visit all plants within the district which use fuel oil and natural gas. It is desirable to have men act as volunteers where possible, but the Fuel Administration is prepared to pay a reasonable compensation to men who can not afford to give their services to the Government. Only men who have had experience in fuel oil and natural gas combustion will be considered.

Short Tractor Courses

Illinois Arranges Two-Week Periods for Fifty Pupils at Each Session

Dealers to Be Admitted for Instruction Also

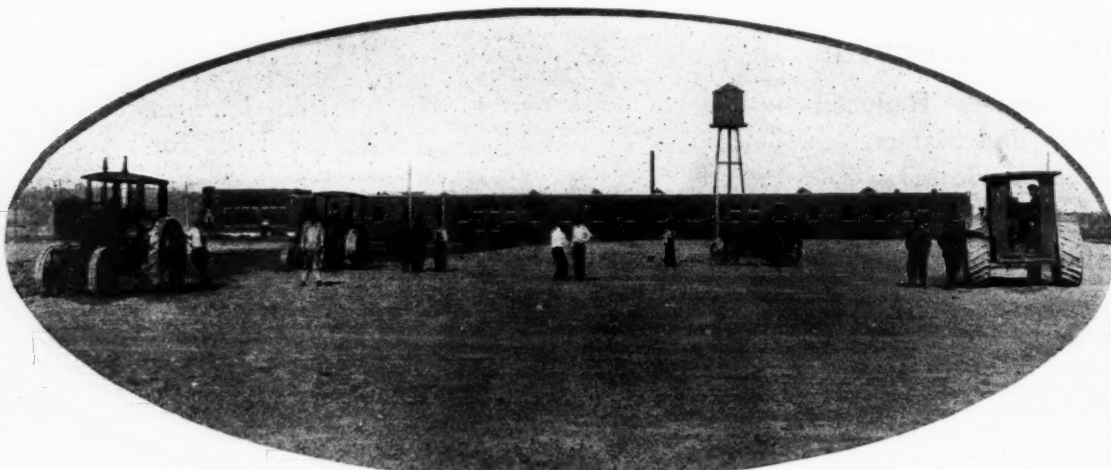
CHAMPAIGN, Ill., July 18.—A series of short-course tractor schools to continue for two-week periods from Oct. 15, 1918, to March 17, 1919, is being arranged for by the Division of Farm Mechanics of the University of Illinois. The plan is to confine the attendance to about fifty pupils for each course, recruited largely from among tractor owners, although automotive and implement dealers who desire to attend will be admitted. The tuition will be \$2 a week and a total attendance of at least 500 is anticipated.

Eight hours of each week day will be devoted to the study of the tractor and tractor equipment. The time will be divided between two daily lectures of an hour each and 6 hr. of laboratory practice. The school will be under the general direction of Prof. E. A. White, instructor in farm mechanics, another lecturer and two or more competent tractor mechanics for laboratory work will be employed.

The course will comprise lectures and laboratory practice on the general construction, ignition, carburetion, lubrication, transmission and care of the tractor. Illustrative charts will be used for the lectures, while the work in the laboratory will be on the tractors themselves, several being owned by the university.

Summary of Tractor Operating Data

Fuel Used	Gas	Gas	Kero.	Gas	Gas
Operators reporting	2	4	14	1	1
No. bottoms on plow	2	3	3	5	6
Original cost of tractor	\$ 827.50	\$1,041.00	\$ 797.57	\$2,020.00	\$2,610.00
Years since purchase	1.5	2.51	1.96	4.5	2
Different days used	32.5	37.25	42.41	58	33
Hours used	219	264.25	293.14	363.5	302.5
Hours trouble	6	17	16.29	6.25	4.75
Percent time-trouble	2.74	6.43	5.55	1.72	1.57
Fuel cost	\$ 80.50	\$ 109.54	\$ 60.28	\$ 260.30	\$ 360.55
Lubricants' cost	\$ 20.45	\$ 18.08	\$ 19.45	\$ 35.53	\$ 15.51
Repair cost	\$ 4.55	\$ 43.15	\$ 38.16	\$ 36.33	\$ 2.50
Miscellaneous cost	\$ 4.85	\$ 4.57	\$ 7.54	\$ 20.44	\$ 6.95
Operating cost per season	\$ 110.35	\$ 175.34	\$ 125.43	\$ 352.60	\$ 385.51
Depreciation, 20 percent	\$ 165.50	\$ 208.25	\$ 159.51	\$ 404.00	\$ 522.00
Interest	\$ 29.79	\$ 37.48	\$ 28.71	\$ 72.72	\$ 93.96
Total cost per year	\$ 305.64	\$ 421.07	\$ 313.65	\$ 829.32	\$1,001.47
Percent repair cost of original cost .....	.55	4.14	4.78	1.80	.096
Acres in farm	238	240	258.57	271	675
Acres cropped	202	199.75	213.63	200	675
Acres corn	131.5	84.5	89.13	60	297
Acres oats	70.5	52.5	66.25	110	120
Acres wheat .....	.....	10	17.30	.....	.....
Acres hay .....	.....	42.75	35.93	.....	258
Acres miscellaneous .....	.....	10	5.28	.....	.....
Horses used before tractor was purchased	11.5	7	9.5	18	24
Horses used after tractor was purchased	8	5	7.35	18	12
Horses replaced	3.5	2	2.15	.....	12
Gallons gasoline	407	527.25	43.8	1,265.5	1,765
Gallons kerosene .....	.....	.....	548.5	.....	.....
Gallons fuel per hour	1.86	1.995	2.02	3.48	5.83
Cost gasoline per gallon	19.7c	20.77c	20.44c	20.56c	20.42c
Cost kerosene per gallon .....	.....	.....	9.34c	.....	.....



Tractor field in North Kansas City where Rahe school students get practical experience in tractor operation

Where Practice Makes Mechanics

Rahe Auto and Tractor School Puts Students Through Laboratory Course

WHEN a school reaches an attendance close to 2000 at the top mark during its regular term it is considered a school of more than respectable dimensions, even in a city, and when that school is a motor car and tractor school, it becomes even more unusual in the light of so large an attendance. Such a school is Rahe's Auto & Tractor School at Kansas City, Mo., which not only had this attendance during the winter but was selected as one of the two schools to which 5000 soldiers altogether were sent this summer for training in mechanics.

To make itself eligible for this selection the Rahe school not only had to already possess the capacity for such a number of students but it had to prove its ability to furnish instruction in the three distinct lines of training that the Army wanted. These were for airplane engines; mechanics for men who after the course will be able to do repair work on motor cars, tractors, trucks and similar vehicles; and another for chauffeurs.

Selected by Government

This capacity and ability this school has. The decision to put Army men into intensive training there was reached after investigation by Lieut. A. J. Etheridge of the Signal Corps and J. C. Wright, a Federal expert on vocational education.

Henry J. Rahe, president of the school, operates two large garages and repair shops and a tractor farm, which make it possible to give thoroughly practical instruction in both motor cars and tractors. Men from the school have made good in the various branches of the motor car and tractor business as salesmen, demonstrators, master mechanics, testers, electric lighting and starting experts, road demonstrators, repairmen, garage and repair shop managers, etc. This winter has been specially big at the school on account of the strong demand for mechanics on the farm and the desire of many young men to equip themselves for expert service before going into

the Army. Ordinarily the summer session is light, because, for one reason, the men who naturally would attend, work out on the farms or operate machines. However, conditions are different this year, with attendance of the soldiers and other civilians who ordinarily might wait until the winter session.

What is called the complete course at Rahe's Auto & Tractor School trains for the following positions:

Garage Managers—There are many vacancies in the garage these days, because the United States Army and Navy need expert mechanics and repairmen just as the

garages of the country do. The Rahe school gives special training along this line.

Salesmen—Motor car salesmen, according to Rahe, should know all about cars, how to operate them, how to make quick adjustments, etc. They teach all these things.

Demonstrators—Rahe works for demonstrators who are competent and careful drivers.

Starting and Lighting Experts—The starter expert is in greater demand than almost any other kind of motor car expert, the school finds, and the course in starting and lighting is given with a view to turn-



Engine-testing department, where students learn to time valves and magnetos and adjust carburetors

ing out such men who are experts from the start of their work outside of the school.

Welding Experts—There is an enormous demand for welding experts, not only in the repair shops of the motor industry but down through the oil and gas fields. Oxy-acetylene welding is taught by actual practice work in all kinds of welding, pipe cutting, metal cutting, etc.

Repairmen—Not only does Rahe train repairmen but it trains them to be expert repairmen.

Trouble Shooters—Here is the real motor car expert, says Rahe. He must be able to grab his tool kit at a moment's notice and rush out on the road to a disabled car. The trouble may be only a puncture, it may be a defective spark plug, or it may be much worse. The trouble shooter must be able to locate the trouble at once and know just what to do.

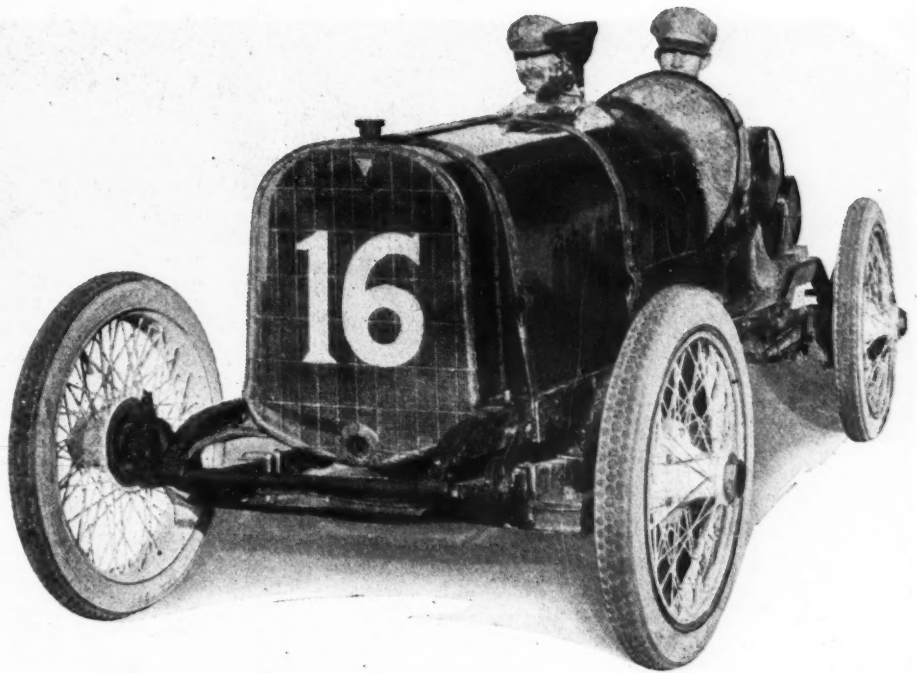
Shop Work—The shop man not only must be able to do general repair work but he must be able to rebuild cars; be thoroughly grounded in all methods of lathe work, blacksmithing and metal work; know how to value repairs in time and material, etc.

Chauffeurs—A chauffeur, says Rahe, is expected to keep his car in good condition and make small repairs, though he sometimes is called on to make big repairs also.

Truck Drivers Also

Truck Drivers—The increasing use of trucks for hauling creates a constant demand for expert truck drivers, and this demand Rahe tries to supply. Drivers turned out from this school are capable of taking entire charge and care of large trucks, making repairs and know the rules for driving and handling trucks.

As soon as a student has completed the work in the demonstration department of the school he is put to work on practice engines, with tool kit and under the care of expert instructors, who show him how to make adjustments, repairs, rebuild, overhaul, etc. Every vehicle used is "live,"



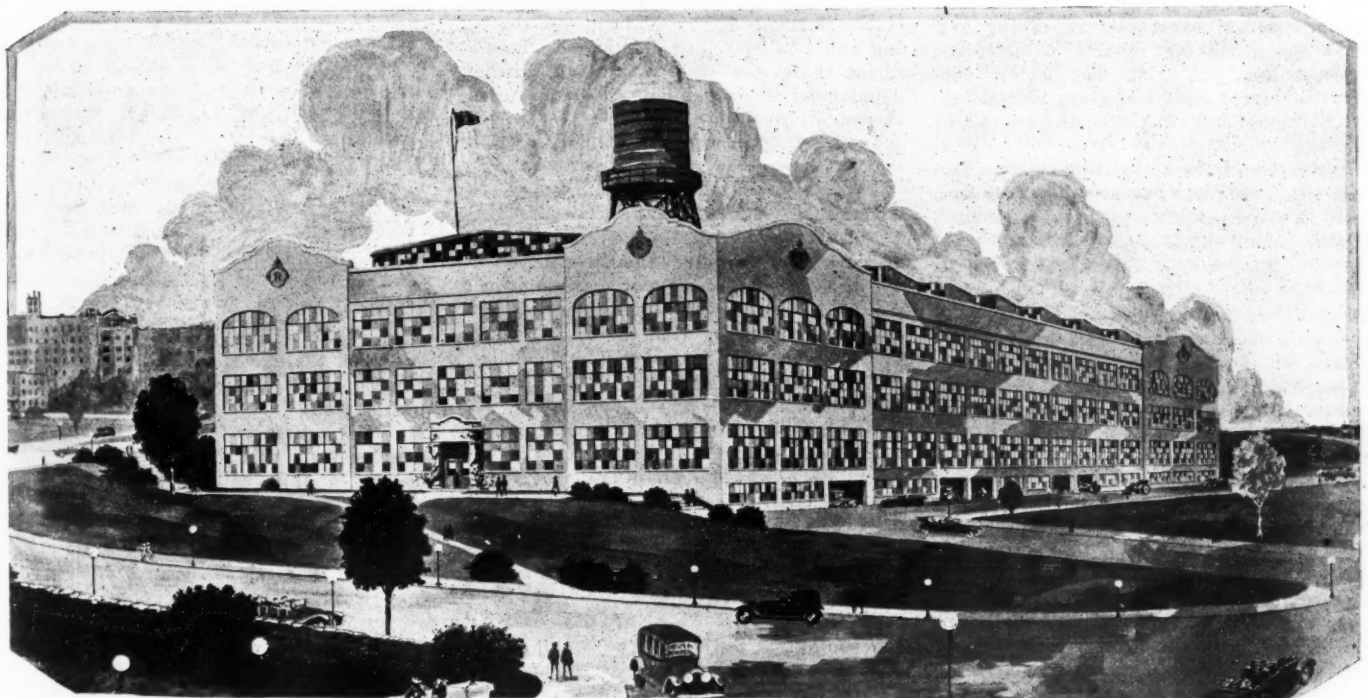
Hudson Super-Six rebuilt for racing at Rahe school

that is, none is any sooner worn out than it is replaced with a new one. Twelve-cylinders, eight-cylinders, six-cylinders and four-cylinders are provided for the students to work on.

After finishing the work in the engine and self-starting departments and training and practice in welding, brazing, vulcanizing, babbitting, etc., the student is given practice in the big repair shops which the school operates. Almost every kind and type and size of car is provided for this practical work, which is taught under men who can teach the students to make repairs in the shortest time possible and do it correctly. Many cars are sent to the

school for overhauling and rebuilding, which adds to the practice possible. Dealers who take on second-hand cars in trade often send them there for overhauling and rebuilding before reselling them. The students are taught how to tear down a car, how to locate troubles, how to determine which parts are worn out and which parts simply need a little repairing to put them in first-class condition.

After making repairs, the students are taught how to assemble the cars, how to adjust the carburetor, wire up the starting devices, install the lighting system, test it out and see that it is running properly, put on the hood and make the car run. Then



Main building and offices of Rahe Auto & Tractor School at Kansas City, Mo.



In the department where starting and lighting experts are made. Practice in testing systems is given

these cars are sent away and others brought in.

Starting and lighting devices of all types are used in the instruction. Each type is mounted on an engine that will run, so that the student gets actual practice in becoming a starting and lighting expert. Installation, repair and operation of electric starters is taught. Practice is given on starters on engines.

You may have judged from this that the school must have mighty few textbooks. It uses none. Training in the care and repair of ignition systems, for instance, is through actual experience in taking systems apart, making repairs, adjustments, reassembling, etc. Coil and battery construction, repairs, recharging, alterations, rebuilding, overhauling, etc., also are taught through practice.

Instruction in home lighting systems also is given. Complete equipment is provided, with gasoline engine, generator, switch board, batteries, etc. Graduates are able not only to sell such outfits but to install and repair them, the school says.

Special Ford Training

Special training in repairs and adjustments, overhauling, etc., on Ford cars is given. Many men now coming to the school are training themselves to be Ford specialists. The Ford is completely disassembled, every part removed, the instructor explaining just what parts receive the most wear and showing the best methods of repairs. Then the car is assembled again. While in the past the school has made no extra charge for this work it expects to make more of a feature of this work later and charge a special fee for this.

The use of the lathe also is taught, as well as other machine shop work. The department is under the direct charge of an expert mechanic and is equipped with lathes and other machinery necessary for

practical training. Students are taught how to select the right kind of lathe for the work in mind and taught not only how to use the lathe but how to install it.

Though no attempt is made to teach the blacksmith trade thoroughly certain forge work necessary in certain repairs on motor cars and tractors is given. The same department teaches the student how to make and temper tools.

The school has twenty-four oxy-acetylene welding outfits, and the welding torch develops a temperature of more than 6000 deg., it is said. Many of the students specialize in this phase of the course. Babbitt-ing and soldering also are taught. In addition there is a sheet metal and brazing department. Vulcanizing is considered thoroughly.

In the tractor work proper, in addition

CONTROL BOARD OF PURCHASES

Washington, July 19—A system of control designed to protect the Government in the procurement of all war materials soon will be operated by the Department of Justice in conjunction with the War Department. A board of control will be appointed which will review every contract. Centralization of purchases of each commodity under a single bureau will be arranged similar to the present plan whereby all motor trucks are purchased by the Motor Transport Service. Contract clauses will be standardized. A daily fiscal survey of Government requirements will be made both for the information of the War Department and the public.

A. E. F. MOTOR TRANSPORT CORPS

Washington, July 19—The motor truck transportation in France has been made an entirely separate division of the Army and will hereafter be called the Motor Transport Corps.

to tractors on the Rahe tractor farm, traction engines are mounted on blocks in the tractor shop and students are given practical instruction in overhauling, repairing and adjusting and operating.

There is a course in stationary gas engines which is by no means an unimportant one. Here also the training is entirely through practice, without textbooks or other than practice.

The courses in detail include:

- Gasoline cars in general.
- Carbureters,
- Transmissions,
- Magnetos,
- Induction coils,
- Ignition systems,
- Self starters,
- Generators,
- Dynamos,
- Batteries,
- Home electric lighting,
- Brazing,
- Blacksmith and forge work,
- Lathe work,
- Engines,
- Oxy-acetylene welding,
- Vulcanizing,
- Driving,
- Garage and repairshop management,
- Traction engineering,
- Farm power.

Incidental

The students live in private homes near the school through special arrangement by the school. The expenses consist of board and room and tuition, which is \$85 for the motor car course and \$50 for the traction engine course, though these rates may be changed for this year. The school operates an employment bureau and not only finds places for its graduates but places students who wish to do part-time work while going to school. The course requires from six to eight weeks. The fees quoted, however, are for what is called life scholarships so that a student once paying them can study as long as he wants to at the school without additional charge. Tools are furnished by the school. A student can start at any time.

Flying in Potomac Park



Brig. Gen. C. K. Lee, chief aeronautical division, British Mission, Washington, D. C., in his Avro airplane ready for flight, above. Land in the face of the wind

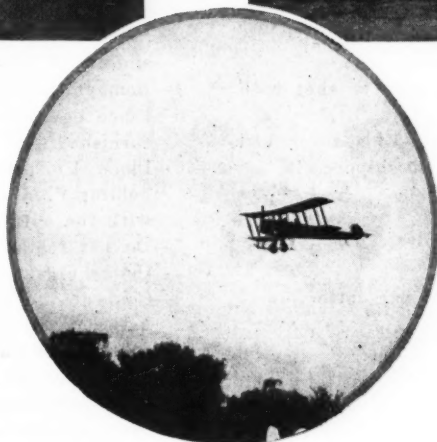
General Lee landing with a passenger. The passenger was a civilian up for his first flight. He was taken to an altitude of 7000 feet, through clouds, loops, Immelmans and spiral

WASHINGTON, D. C., July 19—Flying has become a daily and common event here with the construction of a large hangar at Potomac Park housing several Curtiss JN4 airplanes. A De Havilland airplane equipped with two Liberty engines has just been added and two Spads are expected soon. In addition there is an Avro airplane here, shipped from England, built by the A. V. Roe & Co. and equipped with a 100-hp. Gnome engine. The Avro machine is the property of the British mission and is used exclusively by Gen. C. F. Lee, who heads the British Aeronautical Mission in this country. General Lee was practically the first flyer to exhibit the maple leaf drop, the Immelman loop, the spiral fall and other stunts used at the front, in Washington. His exhibits have been watched with great interest by President Wilson and the various War Department officials.

Many flyers are stationed in Washington in the Aviation Section at desk work. To maintain their records and to secure the 25 per cent extra monthly pay allotment awarded to flyers provided they are in the air a certain number of hours each month, these men make frequent use of the Curtiss JN4 planes. Several may be seen flying each day at all hours over the State War and Navy building, the White House and Washington proper.

CONDEMNS LABOR COMPETITION

Washington, July 19—The using of competitive peace-time methods in the procurement of labor is strongly disapproved in a resolution by the War Industries Board.



Henceforth the board, through its priorities division in proper cases will withhold priority assistance from employers who persist in using competitive peace-time methods in the procurement of labor, which results in the withdrawal of labor from war industries.

LABOR SHORTAGE CONTINUES

Washington, July 19—Continuing shortages of common labor are reported by the weekly labor service of the United States Employment Service. Of 109 offices reporting for the week ended June 29, 66 per cent show a serious shortage. Three cities in California and three in Texas showing a surplus of common labor, while forty-six cities report normal conditions.

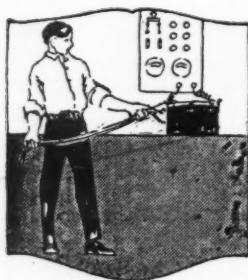
Common labor is especially scarce from Long Island Sound to the mouth of the Chesapeake river. The United States Employment Service is arranging to send men from Maine and Massachusetts, where the shortage is not so serious, to meet this shortage. Common labor is greatly in demand from South Carolina to Texas, and in

the North Central states, except Indiana, where there has been some surplus. In the mechanical and skilled-craftsmen divisions there is a small but noticeable improvement due to the recruiting of skilled workmen and machinists by the United States Employment Service. In general, there is a shortage of skilled workers in the Atlantic and North Central states, while the South and southwestern states are reporting surpluses.

BRITISH SERVICE KEEPS PACE

Washington, July 19—The expansion of the British air service is keeping pace with the growing needs of the British Army and Navy. Criticisms of the quality of the British machines is coming chiefly from those who are ignorant of the enormous technical and manufacturing details and of the huge task of building up these industries in this particular time without affecting the requirements of other service. Secrecy must be maintained of the nature of the duties of the Royal Naval Air Service and of the expansion of the air service and replacement of obsolete machines, because this is just the information Germany seeks and is the same information the Allies seek from Germany. The risk of placing orders for new types of engines and airplanes, despite their lack of proven qualities, must be undertaken if constant importance is to be maintained.

These are some of the important points set forth in a report on the supply of aircraft of Great Britain and the difficulty involved in production.



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the 104th installment of a weekly series of articles begun in MOTOR AGE, issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York.

A thorough explanation of the fundamentals of electric circuits preceded descriptions of the general types of starting, lighting and ignition apparatus, signalling devices, magnetic transmissions, etc. This is being followed by the installation, care and repair of individual systems, beginning with the special equipment for Fords.

Part CIV—Atwater Kent System for Fords Continued

THE chief difference between the type H and type K-2 system is that type K-2 system is provided with an automatic spark control and the type H system has only the manual control. There is also quite a little difference in the mountings.

The different essential parts of the outfit are shown in Fig. 573 and should include the following:

- 1—Four-cylinder type H Unisparker mounted on bracket with extended shaft and bevel gear, A.
- 2—Flexible double conductor cable between Unisparker and coil. This is attached to Unisparker when shipped, B.
- 3—Bevel-gear pinion, C.
- 4—Coil complete with switch, D.
- 5—Four screws for fastening coil to dash.
- 6—Spark advance rod, E.
- 7—Three cap screws, F; one lock-washer, G; one cotter pin.

Making the Installation

- 1—Remove Ford coil box and all ignition wiring.
- 2—Remove radiator as follows:
 - a—Drain off circulating water.
 - b—Remove the right headlamp when facing the radiator.
 - c—Unbolt upper water connection and loosen hose connection on side of engine, so as to leave both sections of hose connected to the radiator. It is easier to unbolt the water connection flange than to remove and replace the upper hose connection.

d—Loosen brace-rod check nut at dash and unscrew rod from radiator.

e—Remove nuts from feet of radiator and radiator may be lifted off.

3—Remove commutator by taking off nut, washer and pin, sliding off contact arm and commutator.

4—Remove three bolts from the gear cover marked A, Fig. 573.

5—Place bevel-gear pinion on timer shaft, using lock washer furnished with outfit and nut which held timer in place, 573.

6—Place Unisparker with bracket on front of gear cover, holding it in place by the three extra long bolts, furnished with the outfit, which fit into the holes A, Fig. 573.

7—Do not fasten the outfit tightly in place, but leave it so that the gears can be unmeshed for timing adjustment.

8—Connect the new spark-advance rod provided with outfit between the ball and socket connection on the steering column and the spark advance lug on the Unisparker. This spark advance lug should point directly toward the dash. The spark control lever on steering-wheel should be within three notches of full retard or the upper stop on the sector.

9—Remove the spark plug in cylinder No. 1 next to radiator.

10—Bring the piston in No. 1 cylinder up exactly to high dead center at top of compression stroke.

Timing the Engine

- 1—Slack off the three bolts holding the Unisparker bracket, so as to leave gears out of mesh.
- 2—Remove cap of Unisparker, rotate distributor block on top

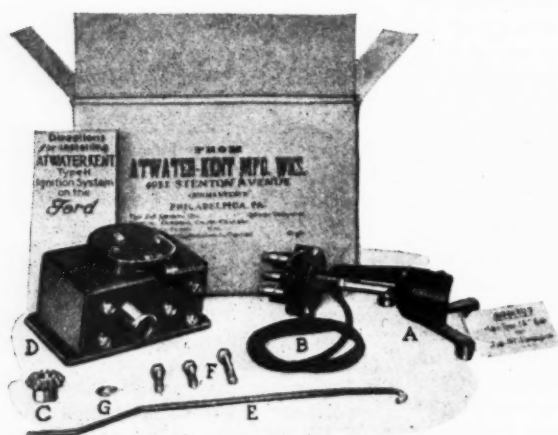


Fig. 573—Essential parts of the type H Atwater Kent ignition system



Fig. 574—Bevel gear mounted in place of commutator for driving Atwater Kent ignition

of shaft counter-clockwise until it points to the right at right angles to the engine.

In performing this operation the shaft should be turned very slowly and steadily until a click is heard. The spark produced by the Unisparker occurs simultaneously with this click, and holding the shaft tightly, the bracket should be pushed toward the gear cover to mesh the gears in the exact position at which the click occurred. The three bolts which hold the bracket in position then should be set up tight, thus clamping the Unisparker in position.

If in meshing the gears the position of the vertical shaft is such that two teeth meet and the gears will not mesh, rotate the vertical shaft back in a clockwise direction just sufficient to enable the teeth of the bevel gears to mesh.

If timed according to these directions, the spark of the Unisparker will occur exactly on center when the spark advance rod is within two or three notches of full retard.

Before proceeding with the wiring, complete mechanical installation thus:

1—Replace the radiator as follows:

- a—Set radiator in position.
- b—Connect upper and lower water couplings. Note that gasket is in good condition.
- c—Bolt radiator in place, taking care not to set up springs under the bolts too tightly.
- d—Replace cotter pins in lock nuts.
- e—Connect brace rod from dash to radiator, screwing it first into radiator and then tightening up lock nut at dash.

2—Replace lamp.

3—Replace spark plug in No. 1 cylinder.

Mount Atwater Kent coil on center of dash so that the round

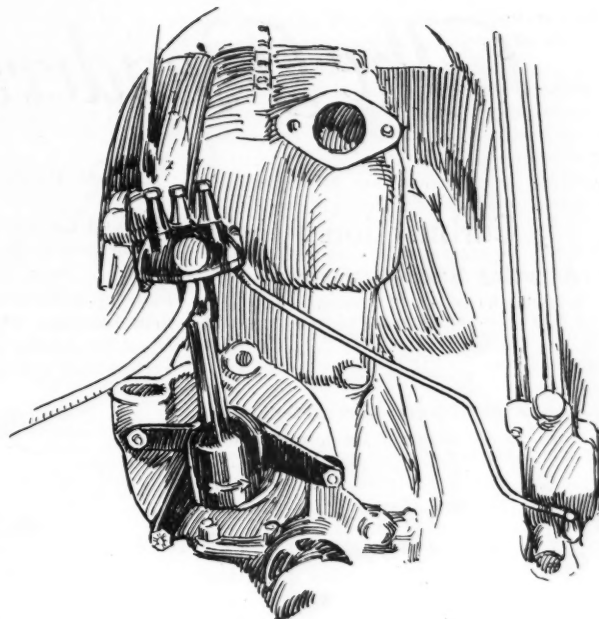


Fig. 575—Type H Atwater Kent Unisparker bolted in place on Ford engine

head of the brace rod fits in the space counter-bored for it on the back of the coil. The necessary screws for mounting the coil on the dash are provided with the outfit. After mounting the coil the remainder of the installation is the same as for the type K-2 system and the same instructions may be followed from this point on.

Shipping Conditions Keep Cars from Argentine

Hope for Better Times Late This Fall

BUENOS Aires, Argentine, May 20—Shipping conditions are the greatest problem the Argentine distributors have to cope with to-day. There is the difficulty of the Argentine merchant getting ships to move his products and added to this the export tax that the government levies on all goods exported. Notwithstanding this situation the good crops of the past season have done much to overbalance the bad conditions following the railroad strikes which began last November. Business conditions are not what they should be which is partly due to the export situation, and also to the restricted imports. Many stocks of goods are being rapidly absorbed and prices are increasing every day the same as in the United States.

The motor car distributors to Argentina are one in coping as well as they can with these generally unfavorable conditions and are looking forward to increased shipments of motor cars, trucks and accessories from America. It is hoped that good shipments will be forthcoming in October so that the coming summer selling season which begins in November will be favorable.

The numerous strikes have not been without their favorable side and during the last ten months, which has been the period of strikes, the motor car distributor has had the opportunity of demonstrating to the Argentine public that the car is a practical and essential vehicle. Some of the more enterprising distributors sent cars all over the country and were able to get a great deal of propaganda out of this. Studebaker

was one of the leaders in this movement.

Gasoline now is selling at 90 cents a gal., which taken in conjunction with the high price of tires has increased materially the cost of operating the car. The scarcity of gasoline has had a depressing effect, but there are assurances that the United States will supply all that is necessary. Lower powered cars and those economical in fuel are bound to have greater selling opportunities than those which are heavy consumers of gasoline and are heavy users of tires. Shipments of gasoline reaching Argentina before October, or even during November and December, will have a very beneficial effect on the sale of cars during the coming spring and summer.

M. A. D. PLANS FALL SHOW

Milwaukee, Wis., July 19—Milwaukee's annual fall show, conducted in conjunction with the Wisconsin state fair, will be held this year as usual. The 1918 fair is scheduled for the week of Sept. 9 to 14. It is held at State Fair park, in West Allis, a suburb of Milwaukee, where exceptionally adequate and convenient provision is at hand for a display of motor cars, trucks, tractors, supplies, etc., that is at least equal in extent to the annual Milwaukee show held in the Auditorium. Because of the increasing importance of the motor truck, the display of commercial vehicles, trailers, etc., will take a larger place in the annual fall show than formerly.

A decision will be made shortly by the M. A. D. with regard to holding the annual

booster tour in August to arouse interest in the September show. It is believed likely that a three-day tour, confined to the southeastern part of the state, will be conducted. Past tours have lasted five to six days and covered from 900 to 1100 miles of Wisconsin territory.

CASSIDY HAS NEW DEVICE

New York, July 19—The Edward A. Cassidy Co., which has built up a distributing business in several nationally known automotive products, has added a gasoline economizer. The product is Eccolene, which is made by the Eccolene Co., Detroit.

In the gasoline economizer field there has always been a conflict of ideas relating to the basic features of the product, and from time to time the trade has enjoyed a few days' sensation at the newspaper announcement that a new product had been found which would wonderfully increase gasoline mileage and power. Many of these sensations proved to be exaggerations, and there has arisen a belief that all economizers were faulty.

Because of this belief the Cassidy company investigated for some months before entering this new field. Eccolene, it states, is made of seven oils and is added to gasoline in the ratio of 1 or 2 oz. of the product to 5 gal. of gasoline, depending on the size of the engine. The result is said to be that the gasoline is thoroughly broken up and all burned. It is said to prevent carbon with no bad after effects. Eccolene will sell for \$7 a gallon or \$2 a quart.

The Readers' Clearing House

Conducted by B. M. Ikert

Carburetor

Adjusting Rayfield Carburetor

Q.—How is the model M Rayfield carburetor on a 1917 Saxon six adjusted so as to give a leaner mixture?—Reader, Russellville, Ala.

This is shown in Fig. 7.

Adjusting Mayer Carburetor

Q.—How do you adjust a Mayer carburetor?—C. T. Mock, Bartow, Fla.

There are two adjustments on this carburetor, one for the auxiliary air and the needle valve. To adjust, first close the auxiliary air valve by loosening the dash pot nut N, Fig. 4, and screwing down the dashpot P as far as it will go. With the engine running slowly cut down the mixture with the needle valve V and run with as little fuel as possible. Unscrew the dashpot very slowly until the mixture changes. As soon as the mixture changes, you know the auxiliary air valve is leaving its seat. Then screw the dashpot down half a turn. This locates the proper seating of the auxiliary air valve. Readjust the needle valve so you can accelerate without backfiring. Avoid too much pressure on the air valve; it must not be screwed down too tight. Avoid also having dashpot backed off too far.

Adjusting Ball & Ball

Q.—Show diagram of Ball & Ball carburetor as used on the 1918 Oldsmobile eight.

2.—Explain manner of adjusting this carburetor.

3.—What is the cause of a Buick jumping while running in high gear at low speed?

4.—Will the Tillotson carburetor give satisfaction on an Overland 79?—Reader, Riffey, Iowa.

1.—Before starting the engine turn both the low-speed screw and spray needle to their seats. Next open the spray needle on the bottom of the carburetor one and a half turns. With the adjustments in this position the engine can be started.

After the engine has been warmed up to normal driving temperature, place the spark lever in the full retard position and open the throttle quickly. If the engine does not backfire, the mixture is slightly

rich and the spray needle should be closed by turning to the right about an eighth of a turn. Open the throttle again quickly and repeat this operation until the engine does backfire, which shows a lean mixture. Open the needle slightly to correct the mixture, which will give the correct setting for

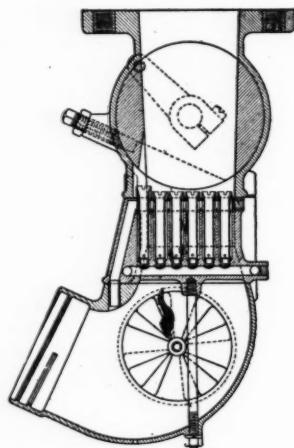


Fig. 2—Miller carburetor, showing a sectional view. There are no adjustments

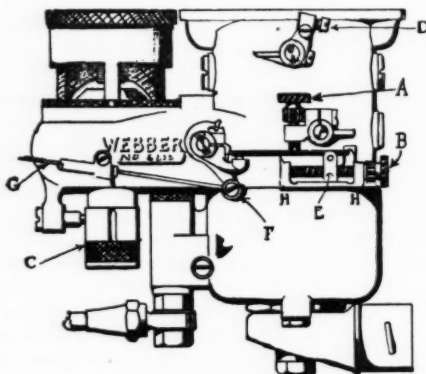


Fig. 3—Side view of the Webber carburetor. There are adjustments for idling and for maximum power

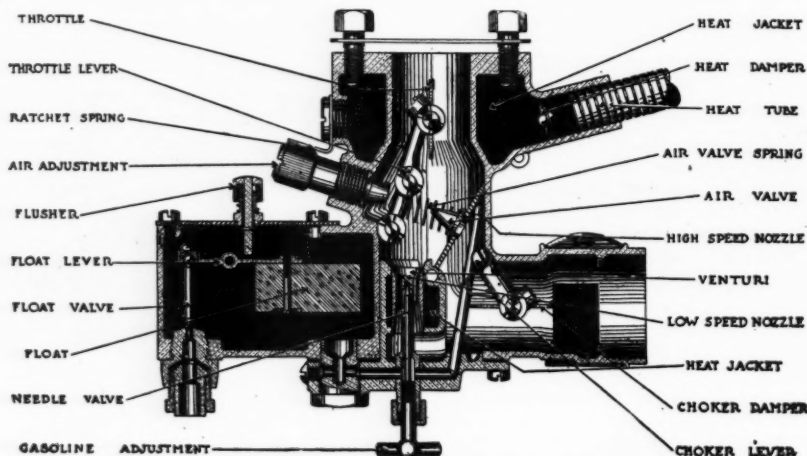


Fig. 1—Marvel carburetor used on Buick. This carburetor has a low and high speed nozzle

all high and intermediate stages of work.

Now adjust the throttle stop screw until the desired idling speed is obtained. If the engine does fire smoothly, the low-speed mixture is too rich and should be corrected by backing out the low-speed screw on the side of the mixer chamber, which will admit sufficient air to make the firing smooth. Then lock in position with lock nut. If the engine has increased in speed from this adjustment, restore the idling speed by unscrewing slightly the throttle stop screw and, if necessary, reset the low-speed screw, both of which must be adjusted in combination. If a more economical mixture is desired, the high and intermediate adjustments may be repeated, having the spark set in the usual driving position instead of retarded. This adjustment will reduce acceleration slightly. Be particular to leave the choker in a wide-open position. Have the choker button on dash all the way in.

3.—Jerky action of this kind may be due to one or two missing cylinders caused by faulty carburetor setting or improper ignition. A fouled plug will cause that cylinder to miss. If the trouble keeps up regardless of what is done to the carburetor or ignition system the universal joint may be suspected. In fact, wear along the entire drive system, such as universals, gears, high-speed clutches in gearbox, rings and pinion gear, will cause jerky action. However, the first thing to look after is a missing cylinder caused by failure of the spark. If the valves are in poor shape, they should be reground and set. Poor compression will cause an engine to misfire also.

4.—There is no reason why the Tillotson carburetor should not give satisfaction on this car. Take the matter up with the makers so they will send you the proper instrument, together with information regarding proper installation.

Adjusting Three Carburetors

Q.—Publish sketches of the Miller, Webber and Marvel carburetors and their adjustments, operation and care.—E. Amidee, Toltec, Col.

Illustrations of the Miller, Marvel and Webber carburetors are shown in Figs. 1, 2, and 3.

The Miller carburetor is a multiple-jet instrument without adjustments other than changing the jets to meet the proper setting. These jets are so arranged that when the rotary throttle is opened it exposes one jet after another to the suction, at the same time increasing the size of the air opening. When the throttle is open all jets are exposed, and when closed it cuts off suction in one jet after another, at the same time cutting off the flow of air through the carburetor. When the throttle is closed all jets and air are cut off with the exception of an idling jet, which is the longest and protrudes above the others. The jets come in various sizes.

The hole in the bottom of the jet is for fuel and can be enlarged if desired. The four holes in the side never should be

changed, as through these holes air passes to the inside of jets. When the engine is idle these jets fill up to the height maintained by the float level and leave a puddle of fuel for starting and insure a quick pick-up. As the throttle is opened the suction drains the puddles. The plug in the bottom of the float chamber should be removed and the bowl drained occasionally to remove dirt.

The Webber carburetor, shown in Fig. 3, is adjusted as follows: For idling only, turn A to the right for lean and left for rich mixture. This adjustment is very sensitive and with a new installation start engine with A open half. For maximum power turn B to the right for lean and left for rich mixture. This adjustment is not sensitive and can be given two complete turns. A should be adjusted one notch at a time. Turn air valve C to the right for more tension and left for less. Clamp the throttle stop screw D tightly after adjustments are made. Fulcrum block E should be in center of its travel from H to H on starting new installation. Starting cam F is operated by either dash or steering control through wire.

Hot air connections should be installed properly and there is a decided advantage with this instrument when connected for hot water. Be sure all gaskets and connections as air, gasoline and water are tight. In starting, when engine is cold, pull dash or steering control up to insure a rich mixture.

To adjust the Marvel carburetor proceed as follows, which is the method used on Buick cars:

Turn gasoline needle valve to right until needle valve is completely closed. Set air adjustment so that the end of the adjusting screw is even with the point of the ratchet spring just above it. Open the gasoline adjustment by giving the needle valve one full turn to the left. Start the engine as usual, if necessary letting it run for a short time to warm up. With spark retarded turn gasoline adjustment to right, closing needle valve until engine idles smoothly.

Advance the spark and turn air-adjusting screw to the left, a little at a time, until the engine begins to slow down, indicating too much air; then turn back to the right just enough to make engine run well. To test adjustment advance spark and open throttle quickly. The engine should accelerate instantly. If it misses or pops back, open gasoline adjustment slightly by turning the needle valve to the left. Do not touch the air adjustment again unless it appears absolutely necessary. The best possible adjustment has been secured when the gasoline adjustment is turned as far as possible to the right and the air adjustment is turned as far as possible to the left, provided the engine runs smoothly at low speeds and accelerates snappily when throttle is opened quickly.

Lubrication

Oil Pump on 1916 Velie

Q.—Is there an adjustment screw on the oil pump of a 1916 Velie Continental 7-W engine? Give drawing.

2.—Some of the valve rods on a 1916 Velie Continental 7-W do not turn as the others do. They sometimes stick and do not come down.

3.—I fill the crankcase on my 1916 Velie to the

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, MOTOR AGE segregates inquiries into divisions of allied nature. Questions pertaining to engines are answered under that head, and so on.

CARBURETION

Reader.....Russellville, Ala.
C. T. Mock.....Bartow, Fla.
Reader.....Rifley, Iowa
E. Amidee.....Toltec, Col.

LUBRICATION

W. H. Terwilliger.....Chicago
Reader.....Mount Carrol, Ill.

ENGINES

L. I. J.....Westby, Wis.
H. C. Freely.....Ritzville, Wash.
N. M. Fritchman.....Boise, Idaho

THE ELECTRIC SYSTEM

Roy Carter.....Temple, Tex.
Walt Clark.....Pawnee, Okla.
W. H. Terwilliger.....Chicago
T. H. S. Read.....Inverness, Mont.
Subscriber.....Holliday's Cove, W. Va.

REBUILDING

Irving T. Patridge.....Milbank, S. D.
William H. Harris.....Harvey, Ill.
R. J. S.....St. Charles, Ill.

MISCELLANEOUS

J. C. Reese.....Newton, Kan.
L. D. Bartlett.....Mount Vernon, Ohio
H. C. Freely.....Ritzville, Wash.
J. S. B.....Jackson, Miss.
Lull Truck Co.....Wausau, Wis.
J. E. Walters.....Lumberton, Miss.

No communication without the writer's name and address will be answered in these columns.

mark, and after running the car I notice the oil is above the mark $\frac{1}{4}$ in. I have just had new piston rings put in.—W. H. Terwilliger, Chicago.

1.—There is no adjusting nut on the oil pump of this model. A sectional view of it

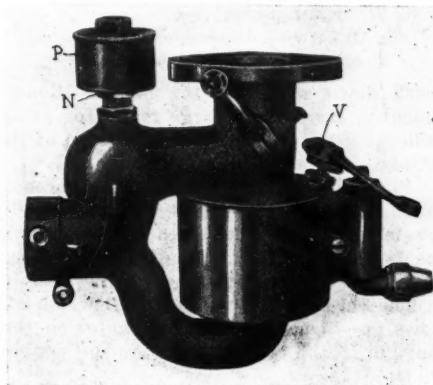


Fig. 4—Mayer carburetor, showing adjusting points for gasoline and air

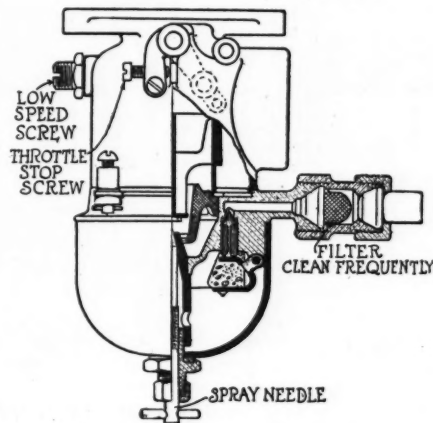


Fig. 5—Ball & Ball carburetor used on the Oldsmobile eight, showing where adjustments are made

is shown in Fig. 6. Oil is circulated by the plunger pump which is driven by an eccentric on the camshaft.

2.—If the engine has seen considerable service it may be that the pushrods and guides are worn so much that the rods stick in them by being forced to one side from the action of the camshaft, or if they are not worn they may be simply sticking from lack of oil.

3.—There is nothing unusual about this. When the engine gets to going naturally the oil is splashed about and some of it that may have remained in the connecting rod troughs drains to the sump. Also the oil when heated expands some.

Oil Leaks from Bolt Holes

Q.—How can I stop oil from leaking out of the bolt holes in the lower crankcase cover?—Reader, Mount Carrol, Ill.

Remove the studs that hold on the cover about $\frac{1}{4}$ in. and wind them with six or seven turns of cotton twine between the lock washer and case. Perhaps you bolted the cover on wrong the last time it was removed. One side never should be tightened up completely, as it will pull over to that side so much that the studs on the other side cannot make the cover lay perfectly flat. This would cause oil to leak around the joint and the oil that you think comes from the bolt holes in reality may come from the joint.

Engines

Two-Cycle and Four-Cycle

Q.—How many revolutions of the crankshaft each time it fires in a two-cycle engine? In

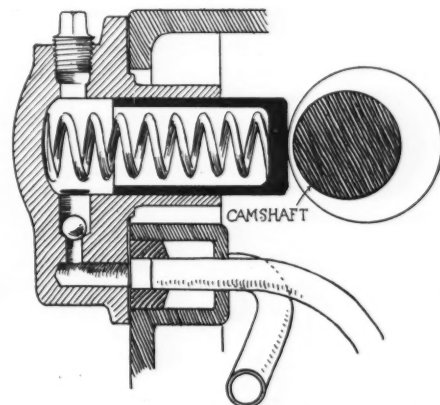


Fig. 6—Sectional view of oil pump used on 1916 Velie. The pump is operated by an eccentric on the camshaft

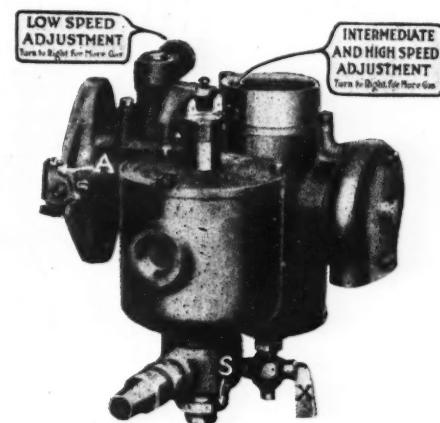


Fig. 7—Rayfield carburetor used on the 1917 Saxon six, showing adjustments

other words, explain the difference between a two-cycle and four-cycle engine.—L. I. J., Westby, Wis.

A cycle in general is a series of events occurring in succession which go to make up a complete operation. Some engines take more strokes to complete their cycles than do others. By far the greatest proportion in motor car practice require four strokes of the piston between explosions; that is, the piston travels up twice and down twice, making two revolutions of the crankshaft between explosions. These have come to be called four-cycle engines. There are others which take only two strokes, one up and one down; that is, one revolution of the crankshaft to complete the cycle. These are called two-cycle engines.

The four operations of a four-cycle engine are shown in Fig. 8. When the piston starts to go downward the mechanically operated intake valve opens and thus allows the piston to suck mixture into the cylinder, as shown at the extreme left of the illustration. The next illustration shows the piston starting to go upward. At this point both intake and exhaust valve close, for otherwise the mixture would be pushed out. When the piston gets to the top the mixture is fully compressed and at this point the explosion takes place and throws the piston downward, as shown in the next illustration. Both valves are still closed. When the piston gets almost to the bottom of the explosion or power stroke the exhaust valve opens, the piston starts upward and thus pushes the burned gas out. The cylinder is now ready to receive again a fresh charge, which it gets when the piston goes down again.

There are two kinds of two-cycle engines, one called the two-port and the other the three-port, so-called from the number of gates or ports in the cylinder by which the gas is let in and out. Fig. 9 shows the three-port type of two-cycle engine.

In the two-cycle engine we simply make the crankcase air-tight and let it do some of the work getting the charge ready for firing. The crankcase acts as the chamber into which the fresh gas is drawn from the carburetor by the piston on each up stroke, and from there it is forced into the cylinder above the piston through a by-pass on

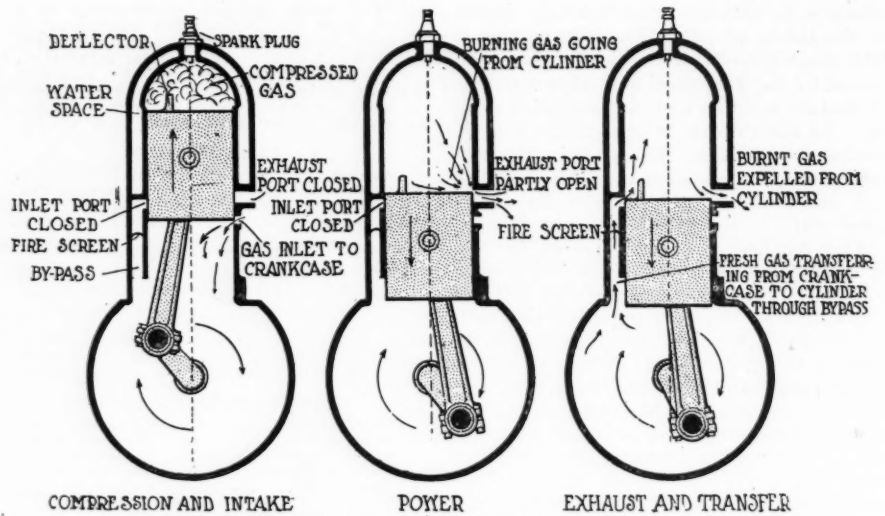


Fig. 9—Three-port type of two-cycle engine, showing operation

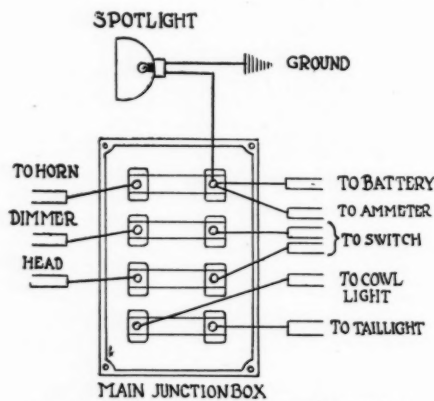


Fig. 10—Wiring diagram, showing method of connecting spotlight on 1916 Velie

each down stroke of the piston. Consequently, there is a charge ready for firing whenever the piston reaches the top of its stroke.

Fig. 9 illustrates the way this is accomplished in the three-port type of two-cycle engine. In the left figure there are two ports on the right side of the cylinder, the lower one, the inlet port, being simply a hole through the cylinder wall which allows gas to pass from a carburetor on the outside to the crankcase below the piston,

whenever the latter does not cover up the hole. A few inches above the inlet port is the exhaust port, which opens the combustion chamber to the muffler, when not covered by the piston.

On the left side of the cylinder wall there is an L-shaped passageway opening at its lower end to the crankcase and at its upper end to the cylinder about opposite the exhaust port. This is a second inlet port and the vertical passage is called the by-pass or transfer passage by which the fresh gas is passed from the crankcase around the piston and into the cylinder above the piston.

The figure on the left shows the condition of things just before a spark occurs. The piston is almost at the top of its stroke; it is compressing the gas in the combustion chamber and at the same time has been creating a suction in the crankcase, so that when the lower edge of the piston passes the gas inlet port on the right, gas is drawn into the crankcase by the suction.

When the piston reaches the top of its stroke, the spark occurs, the explosion drives the piston down, compressing all the gas that has been drawn into the crankcase. When it gets most of the way down, the top edge of the piston uncovers the exhaust port and the burning exhaust gas

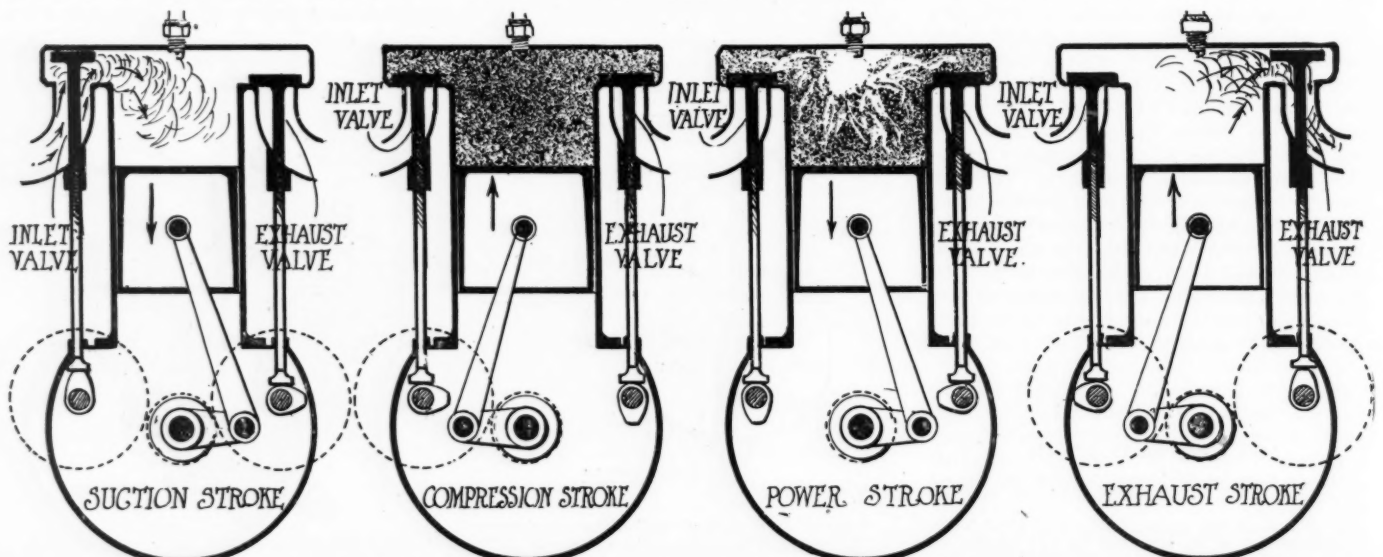


Fig. 8—Sketches showing the four operations of a four-cycle engine in their sequence

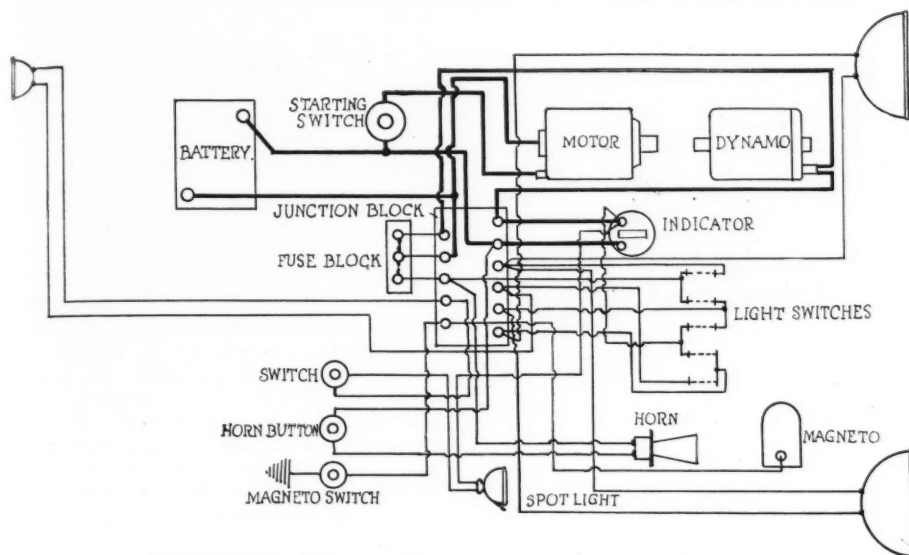


Fig. 11—Wiring diagram of Bijur starting and lighting system used on 1915 Apperson

rushes out of the cylinder. The middle illustration shows the exhaust port just opening. By the time the piston is down far enough to open the exhaust port fully it has begun to open the second inlet port on the other side, allowing the gas which is being compressed in the crankcase to rush through the transfer passage or bypass into the combustion chamber as illustrated at the right. By the time the piston gets back to near the top of its stroke, it has covered up the second inlet port and the exhaust port and has compressed the gas in the top of the cylinder and is about ready to fire again.

On the top of the piston will be noticed a plate sticking up into the cylinder. It is called a baffle plate and simply deflects toward the top of the cylinder the fresh gases entering from the by-pass so that they will not get mixed with the exhaust gases and be drawn out the exhaust port with them. The screen shown prevents flame shooting into the crankcase.

There is another type of two-cycle engine known as the two-port, which more nearly resembles the four-cycle engine. Although this latter type operates upon the two-cycle principle, it has an intake valve very much like that used on four-cycle engines. The transfer of the gas from the crankcase to the cylinder and the exhaust valve are similar to those of the three-port type.

Bore and Stroke of Buick

Q.—What is the bore and stroke of the 1917 Buick 45-hp. engine?—H. C. Freely, Ritzville, Wash.

The bore is $3\frac{1}{4}$ in. and the stroke $4\frac{1}{2}$ in.

Valves on Maxwell Stick

Q.—I have had some trouble with the valves sticking in my 1918 Maxwell. I can remedy this by squirting oil in the priming cups on the intake manifold, but this is troublesome. Could this trouble be remedied by putting oil in the gasoline? If so, what kind and how much? Would this cause carbon to collect in the engine?—N. M. Fritchman, Boise, Idaho.

The chances are your trouble will disappear in a short time as the car is new and the parts are naturally a little tighter than they will be after being used a short while. You can remedy sticking valves some by removing them and putting flake graphite

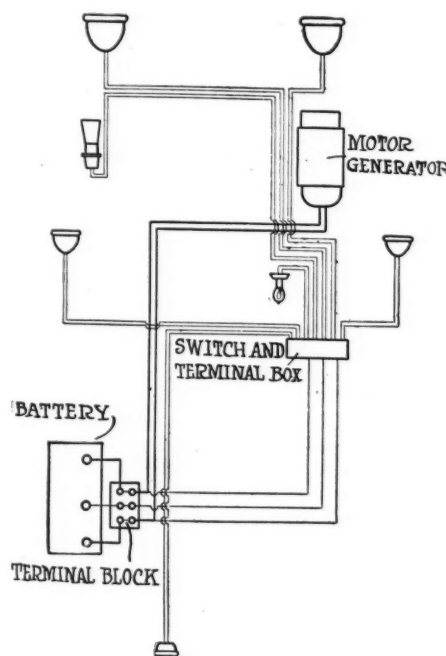


Fig. 12—Wiring diagram of Wagner starting and lighting system on Studebaker 35

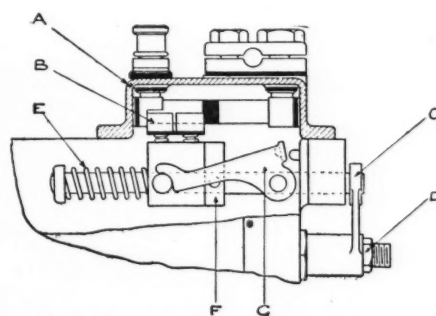


Fig. 13—Generator switch used on 1913 Cadillac, showing cover in place

on the stems and in the guides. Oil in the gasoline will do no harm; in fact, marine engines of the two-cycle type are oiled this way almost entirely. The amount to put in the tank naturally varies with the engine. In your case, if you wanted to do this, about a pint of lubricating oil to 5 gal. of gasoline should be used. Do not

simply dump the oil in the gasoline. Proceed as follows: Place a chamois strainer in a funnel in the gasoline filler pipe and pour the oil in it. The oil will not run through the chamois. Now empty 5 gal. of fuel into the funnel. The gasoline will take the oil through with it, thoroughly mixing it also.

We hardly believe it necessary for you to resort to this method, as the stems soon will loosen up of their own accord.

The Electric System

Wiring of Studebaker 35

Q.—Publish wiring diagram of Wagner one-unit starter and generator used on Studebaker 35.—Roy Carter, Temple, Tex.

This diagram is shown in Fig. 12.

Wiring of Apperson

Q.—Publish diagram of lighting and ignition wiring on the Apperson.—Wait Clark, Pawnee, Okla.

A wiring diagram of the Bijur starting and lighting system used on the Apperson is shown in Fig. 11.

Spotlight on 1916 Velie

Q.—Give drawing, showing method of connecting spotlight on a 1916 Velie. It has a Remy system.—W. H. Terwilliger, Chicago.

A wiring diagram showing the method of attaching spotlight on this car is shown in Fig. 10. As one side of the battery is grounded, you can ground one of the spotlight wires and run the other to the horn terminal on the main junction block, as shown.

Battery with Leaky Cell

Q.—I have a Willard six-cell storage battery, 12-volt. I cannot keep it fully charged. The ammeter shows a charging rate of 8 amp. and, not doing much night driving, the battery should stay fully charged. One of the cells is leaky. Would that keep the other cells from properly charging? Could I replace that broken cell myself in my garage? I have a general idea how it should be done. What difficulty do you think I would encounter in doing it myself? Am inclosing sketch showing position of leaky cell. What would be the result if I isolated No. 3, the leaky cell, by connecting positive terminal of No. 2 cell to negative terminal No. 4? The following is a hydrometer reading of the storage which were taken once a week. Notice that specific gravity is getting less slowly:

1.240	1.250	1.230	1.265	1.250	1.250
1.240	1.250	1.230	1.265	1.250	1.250
1.230	1.250	1.230	1.260	1.240	1.240
1.220	1.240	1.215	1.245	1.240	1.230

The battery was fully charged this April.—T. H. S. Read, Inverness, Mont.

The only thing for you to do is to replace the leaky jar with a new one. The whole battery is affected by a leaky cell and it would do no good to make the connections you refer to. The best plan is to take it to a good battery man or service station, as you would not have the equipment to burn in the connectors, etc.

Switch Probably Defective

Q.—I have a 1913 Cadillac, on which the cut-out relay will not cut-out at over 10 amp but charges up to 30 amp. The starter will not work in any way except attached to short storage battery wire, with wire to field on motor. I have tested it in every way I know of and think the trouble is in the block on the back of the generator. This is the block with four connections on it.—Subscriber, Holliday's Cove, W. Va.

Your trouble is likely to be in the generator switch. If the speed of cranking gradually decreases when the battery is in fully charged condition, remove the cover

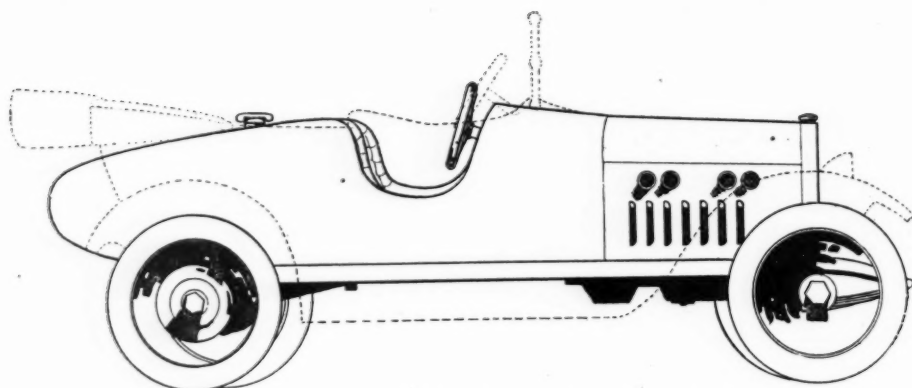


Fig. 14—Suggestion for rebuilding Briscoe into racing car for ½-mile dirt tracks

A, Fig. 13, of the generator switch. If the contact blocks and contact bars are dirty, clean them, and if they are pitted, grind in with a valve compound. Then thoroughly clean and lubricate with a light oil.

The functions of the generator switch are to connect the generator windings with the battery, when in the forward position, and when in the rear position, to complete a path for a current through the motor windings. The switch comprises the cover A, carrying three conductors with necessary terminals. Beneath is a sliding contact block, B, pressed against the conductors in the cover and mounted on an operating rod C, the exposed rear end of which is connected by an arm to the transmission operating rod D. The sliding rod is not directly connected to the pull rod but is forced into its starting and operating positions by collars, a coiled spring E being interposed between the block and collar upon the forward end of the pull rod and the rear collar F, abutting directly against the sliding block, a latch G engaging with pins upon the block serves to hold it in its forward position.

When the clutch pedal is depressed in starting, the inter-connected operating rods of the switch and transmission are pulled to the rear. The action of the switch-operating rod is, first, to compress the coil spring E against the block. When the pull rod nears the limit of its travel, the rear collar on the switch rod trips the latch which retains the sliding block in its forward position and the pressure of the coil spring

snaps the block into its rear position, permitting current from the battery to flow through the motor windings.

Rebuilding

Speedster Built by Reader

Milbank, S. D.—I inclose three views of a speedster which I built last winter. The changes made were these: Houk wire wheels; 3 to 1 gear; Rayfield carburetor, and Atwater Kent ignition. I made all of the body, with the exception of the radiator, which was made by Todd of Minneapolis. I lowered the steering post at the wheel 9 in. The body, cowl and hood all are made of 18-gage steel. Upon a first glance at the machine, people form the impression that the high cowl interferes with sight of road, but this is not true, as the eyes of the driver are almost a foot above the level of the cowl.

The radiator holds a little over 5 gal. of water. I used cork insert transmission linings, G-P cut-out, and Gabriel snubbers on the rear axle. While I did not build this for racing purposes, I can get 55 to 59 m.p.h. out of it on a straightaway. I used two coats primer for paint and had good luck with it, as you will note by the shine. —Irving T. Patridge.

Building Car for Racing

Q—I intend to build a car for racing on ½-mile tracks. I have a 1916 Briscoe engine in fine shape and it is quite speedy for a passenger car. I thought of using the engine only and fitting same in a different chassis of very low design, or do you think I can lower this

chassis to any extent? I wish to enlarge for valves as much as possible and also the bore of the engine, if you think this can be done safely. Is this necessary? Can you tell me where I can get a special camshaft? I will fit special alloy pistons. I want to make this a strictly racing job and am going to do practically all of the work myself. Publish a diagram of this car or one of low design from which I can work.—William H. Harris, Harvey, Ill.

No two ears of one make handle alike and consequently the driver or owner is the only one who really understands it sufficiently to determine its strong or weak points. If the car is wanted strictly for racing, easy riding, fuel economy, etc., must be sacrificed. In a racing car, for example, the driver is not so particular as to how many miles per gallon he can go, but how fast he can cover the distance. We suggest that you enlarge your valves as much as possible judging this by the amount of stock in the block around the ports. Even if you punch through the casting you can have it welded. We do not believe you will gain much by reboring the cylinders. While it is theoretically correct that an increase in piston displacement gives more power, it does not always work out this way in practice. The better plan, we believe, would be to enlarge only the valves and fit a special camshaft to give them a greater lift and quicker opening and closing. This also would mean fitting a larger carburetor. If you are using magneto ignition you might change the setting so the spark occurs a trifle earlier in the upward movement of the piston on the compression stroke. In Fig. 14 is shown a suggestion of how you might build this car.

In the matter of rear axle gears you probably will have to do some experimenting. We should think that gears with a 3 to 1 ratio would be about right for dirt track work. The thing to bear in mind is that the engine revolutions must be kept up to the highest figure possible and gears fitted to maintain this speed.

Racy Touring Design

Q.—Show design for low-built touring car designed on racy lines and having individual fenders.—R. J. S., St. Charles, Ill.

In Fig. 16 is shown a design such as you ask for. The body is built with a beveled edge extending in a semi-circle around the rear. The rear curtain fits around this circle, and the top is so arranged to fit inside the body. The fenders are fitted individ-

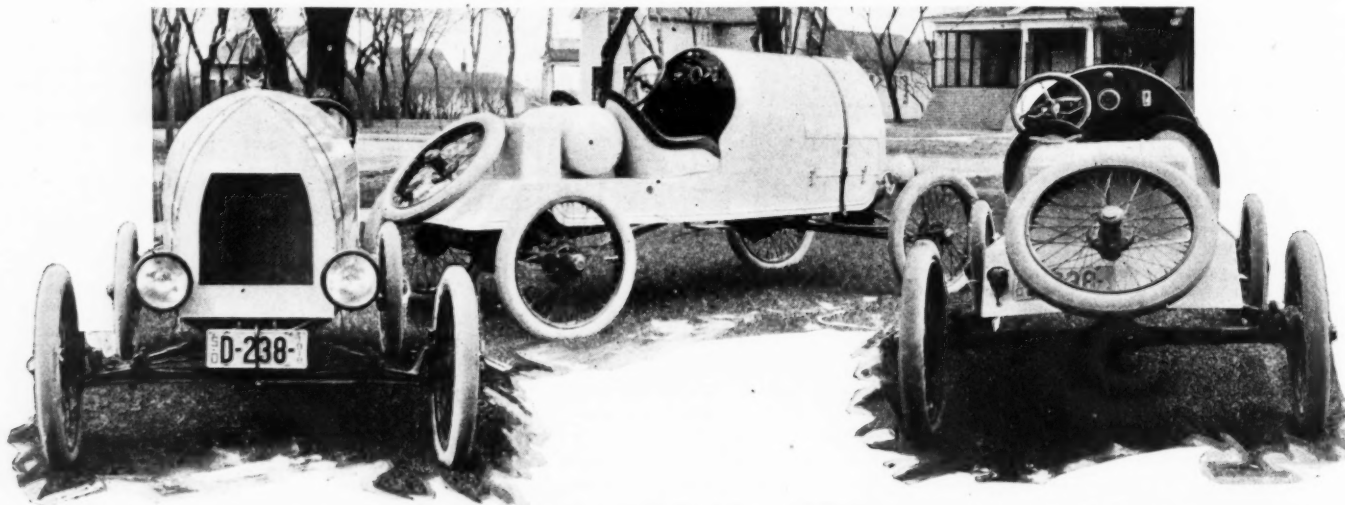


Fig. 15—Three views showing how reader constructed a speedster with which he makes 55 to 59 m.p.h.

ally, close to the wheels. The front ones could be fastened directly to the steering knuckles to turn with the wheels. This would not be necessary if aprons or splash shields were fitted to the fenders. Ventilators in the top of the hood and cowl help to emphasize the lines and aid in cooling the front compartment.

Miscellaneous

Car Lacks High Speed

Q.—I have a Jeffery four, 1914 model, which has fallen down on speed. I cannot get it above 35 to 40 m.p.h. with throttle wide open. Had the valves ground and timed; compression seems to be about the same as ever; carburetor set as it always has been; gets plenty of gasoline; ignition has never been touched; main crankshaft bearings are tight and up to 25 m.p.h. the car works well, but above that there is lots of vibration and no speed. Its hill climbing ability is not good. Is there such a thing as the spark getting loose and causing too late a spark even if the lever is all the way up? The engine gets very hot.—J. C. Reese, Newton, Kan.

One thing to suspect is a slipping clutch. This would allow the engine to run more or less freely and under such conditions it would vibrate considerably, as there would be no load on it. This also would put a check on the car speed and the engine might get hot from the extra revolutions. Also if there is wear in the spark operating mechanism the engine would overheat, if the spark is in a too far retarded position.

It may be your car needs a thorough going over, for even if all the things you mention appear all right, there may be just enough the matter with them so that collectively they allow the car to run sluggishly. Check up on your ignition first to make sure the spark is advanced properly. Perhaps it would help to change the carburetor adjustment, for the engine may be getting too rich a mixture and load at high speed. This would cause overheating and consequent falling off in power.

Wants Car Patterns

Q.—Give names and addresses of manufacturers of patterns for building racing and speedster bodies. The concerns I have reference to only make patterns; they do not build bodies.—L. D. Bartlett, Mount Vernon, Ohio.

Two such companies are the Kuempel Co., Design Department 28, Dubuque, Iowa, and the Rusta Mfg. Co., 2125 Michigan avenue, Chicago.

Wire Wheels for Old Car

Q.—Could wire wheels be secured for 1912 cars?

2—Could ball bearings be put in a Ford engine?—H. C. Freely, Ritzville, Wash.

1—Yes. It will be necessary to give the makers the name and model of car in ordering.

2—This is possible, but it would be a very hard job and besides ball-bearings would not be as satisfactory as plain.

Reader Makes Valve Grinder

Lumberton, Miss.—I am inclosing a crude sketch of a valve grinder that I figured out and used successfully. It is universal and can be used on any make of car. It is made of a discarded Ford camshaft gear, a piece of broom handle, two wire nails, a 24-in. strip of pine, 1½ by ½ or ¾ in., and a piece of twine. You can grind an ordinary set of valves in 10 to 15 min.

To start, wind the string up around the broom handle, which shortens and brings the cross-piece up nearer the top; then grasp the cross-piece and push it down with a quick push. The momentum of the fly-wheel winds it up the other way; it is only necessary to keep pushing down. Use a

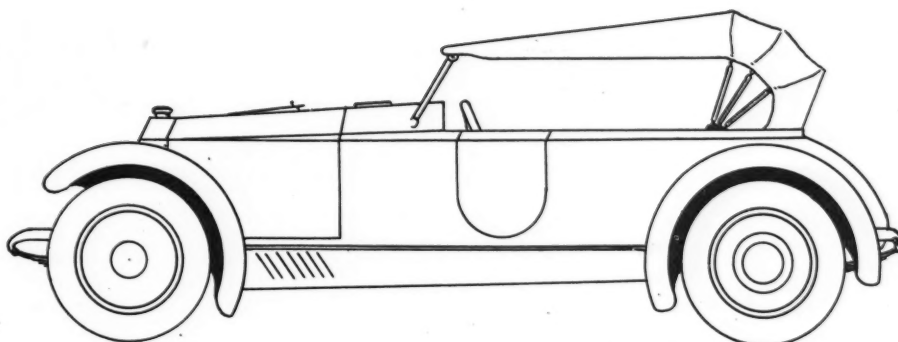


Fig. 16—Suggestion for racy-looking touring car with beveled edges and individual fenders

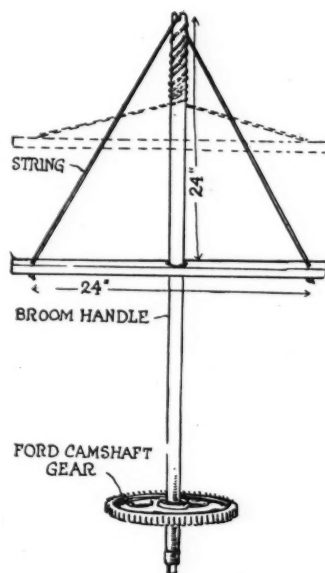


Fig. 17—Valve grinder made by reader

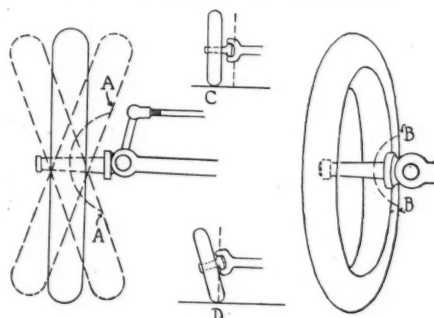


Fig. 18—Diagram to illustrate why front wheels of motor car are inclined. The circle A-A is greater than B-B, as in the former case the wheels are not inclined

spring under the valve that will pick it up every time you release the pressure on the downward stroke.—J. E. Walters.

Gear Ratio of Several Cars

Q.—What is the gear ratio of the following cars: Buick, Haynes, Grant, Empire, Reo, Saxon four and six, Overland 83 and 86, Studebaker four and six, Hupmobile, Chevrolet 490, Chevrolet, Oakland light six, large six and Oakland eight, Willys-Knight, Chalmers 40 and 48?—J. S. B., Jackson, Miss.

The gear ratio on high of the cars you mention is as follows:

Buick	.....3.77 to 1
Haynes	.....4 to 1
Grant	.....4.5 to 1
Empire	.....4 to 1
Reo	.....4 to 1
Saxon four	.....4.5 to 1
Saxon Six	.....4.5 to 1
Overland 83	.....3.70 to 1

Overland 86	.....4.01 to 1
Studebaker four	.....4 to 1
Studebaker six	.....3.7 to 1
Hupmobile	.....4 to 1
Chevrolet 490	.....3.67 to 1
Chevrolet	.....4 to 1
Oakland light six	.....4.42 to 1
Oakland large six	.....4.25 to 1
Oakland eight	.....4.8 to 1
Willys-Knight	.....4 to 1
Chalmers 40	.....4.50 to 1
Chalmers 48	.....4 to 1

Why Wheels Are Tilted

Q.—Give good explanation of the reasons for tilting the front wheels of a truck from the perpendicular plane, bringing the wheels closer together at the ground than at their upper edges.

2—If the king bolt or pivot about which the wheel swings in turning a corner were located in the center plane of the wheel, thus making the wheel swing about its own perpendicular center line, would there then be any advantage in tilting the wheels as mentioned?

3—Is it good practice to toe in the front wheels to bring them closer together at the front edge than at the rear?—Lull Truck Co., Wausau, Wis.

1—Front wheels are inclined to bring the steering pivot as near the center of the wheel as possible, to get the greatest ease of operation for the smallest motion of the hand. The position of the front wheel of a bicycle is typical in this respect. The steering spindles of a motor car are inclined downward at such an angle as will cause the tire or periphery of the wheel to strike the ground at a point coincident with a line drawn through the center of the knuckle. Refer to Fig. 18, which shows the action of a front wheel not inclined and one that is conventionally inclined. At C is shown a wheel perfectly vertical with the steering spindle in a straight line with the axle. When this wheel is turned it will describe a circle about the center of the knuckle as shown by the dotted line A-A. If the wheel is inclined, as in D, the circle described will be very much less with easier manipulation of the steering wheel.

2—There would be no advantage in inclining the knuckle in this case, but when the wheel is inclined it is said that the force of a collision, as with a large stone, etc., is delivered at or about the line of incidence, rather than on the hub or its axle connection, thus insuring more security and saving the driver from road shocks.

3—Front wheels generally are toed in at the front slightly to compensate for wear or natural springiness in the tie rod joints, drag link, steering gear, etc. The tendency for the front wheels is to spread when driven ahead and if they are toed in just a trifle they will run straight under power and thus insure even tire wear.

The Motor Car Repair Shop

Tools for Straightening Bent Parts

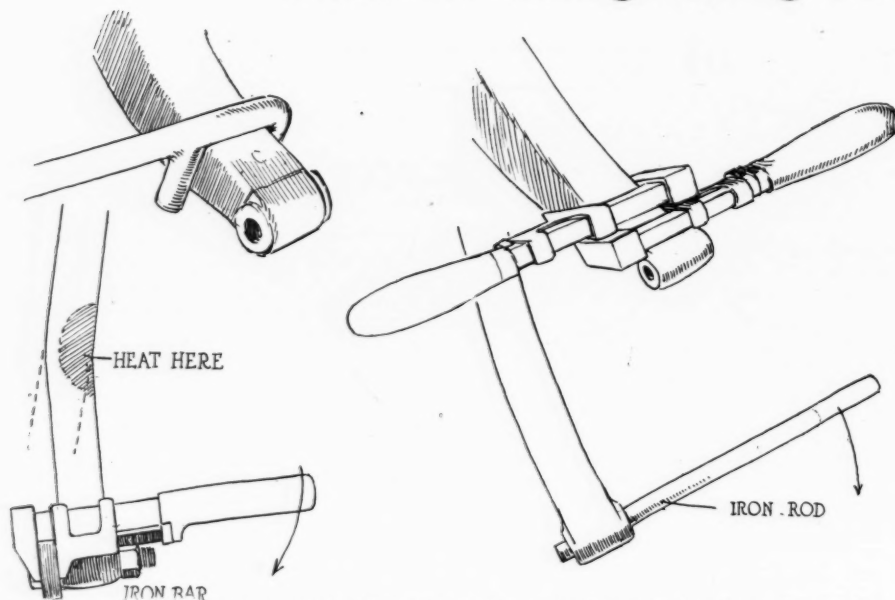


Fig. 1—Four methods to straighten bent frame horns. Heat must be applied in every case, and usually the two wrenches will bring the frame back into line

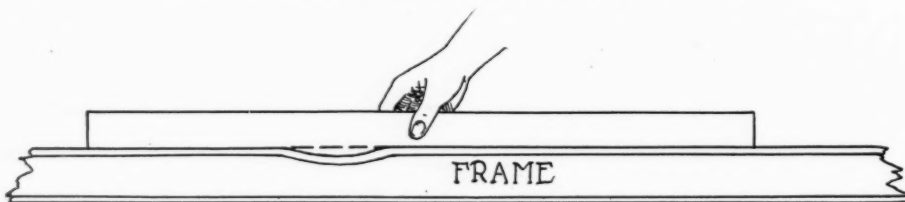


Fig. 2—How straight edge is used to find small depressions in frame

IN last week's issue of MOTOR AGE there was given a list of the tools and equipment garages should have to straighten bent fenders, frames, rods, etc. Herewith are some practical examples of how the tools should be applied. Some tools can be used for more than one thing, while others are expressly for one purpose. In addition to the tools and equipment given the repairman will find a large straightening table a valuable asset. This is in reality a large anvil but has not the conventional horn. Its general shape is shown in Fig. 4. It should be about 28 in. wide and 30 in. long. The top is cast iron 3 in. thick and the legs are 2-in. pipe let into holes in the under side of the top. At the bottom the pipes are held in flanges lag-screwed to the floor. The table must be made rigid enough to withstand heavy blows.

Two other handy pieces of apparatus consist of a forge to heat some of the heavier parts that require heating over a large area and an oxy-acetylene welding outfit. The welding torch makes it possible to concentrate intense heat upon the part to be heated.

Straightening Bent Frame Members

Since channel steel is used almost exclusively in motor car work the method of straightening bent frames is more or less

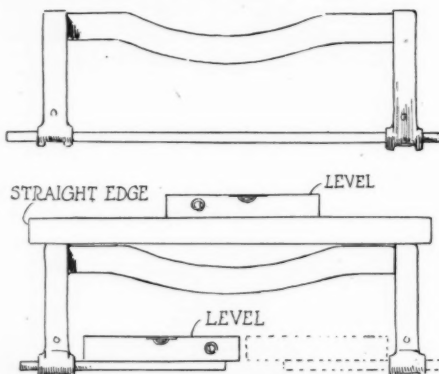


Fig. 5—After straightening, the frame horns can be lined up with rods and spirit levels

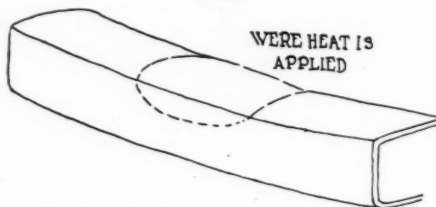


Fig. 6—Bend in frame, showing portion where heat is to be applied

the same in every case. In some instances angle iron has to be reclaimed, but what applies to the channel applies equally as

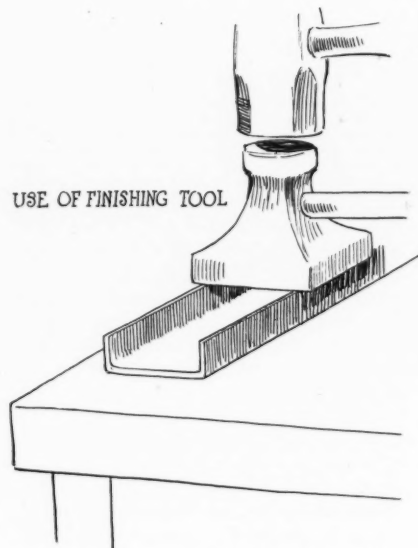


Fig. 3—A cross member being straightened with the finishing tool on the straightening table. A heavy sledge is used

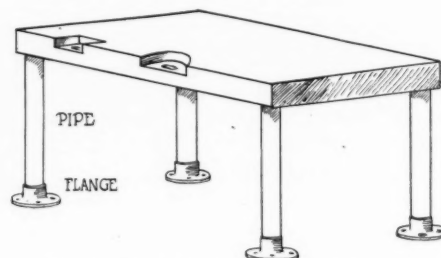


Fig. 4—Straightening table used for supporting work. It is made of cast iron supported on legs of pipe. The indentations allow for straightening fenders, etc. The fuller is held in the square holes

well to angle iron. The bend usually occurs where there is a hole through the frame. Minor indentations can be found with a straight edge, as shown in Fig. 2. After the point of bend has been found the metal should be heated at that point to a dull red color. Do not heat the metal adjacent to the bent part.

The particular type of bend determines what tool must be used in straightening it out. Frequently the large bending or straightening bars cannot be used and in such cases the work can be done with a jack, large monkey wrench or chain hoist. It does not really matter so much how the straightening force is applied so long as the bend is properly heated. After the parts have been brought into about their normal position again with the straightening bars, a large wrench can be used for taking out the smaller crimps. The latter should be heated in the same way as before. The work must be done slowly to insure good results. Final truing up is done with the forming chisel or finishing tool.

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Stephens Brings Out Six-Passenger

New Model Is Offered on Same Chassis
but with Longer Body

THE Stephens Motor Branch of the Mo-line Plow Co. has brought out a new type of Stephens Salient Six, model 76, a six-passenger car along the lines of the four-passenger model and on the same chassis but with body lengthened to accommodate two auxiliary seats.

The chassis has the same perfected overhead-valve engine that is used on other Stephens models. This engine is of unusual construction, it will be remembered, in that it is made up of five main components, a valve-carrying head, a manifold-carrying head, a cylinder head and a valve compartment cover, all separate units besides the oil pan. Scientific embodiment of the intake manifold with the cylinder head, together with a machined manifold and an unusually short distance for the gas to travel to the farthest cylinders, makes a car of unusually flexible performance. The units which handle the intake and exhaust of the gases were designed with a view to handling the present low-grade fuel and burning all the gas, permitting rapid acceleration as well as a very commendable degree of flexibility.

A Stromberg carburetor is used. Lubrication is by force feed. Cooling is by thermo-syphon. The engine, which is made by Root & Vandervoort, has a bore and stroke of $3\frac{1}{4}$ by $4\frac{1}{4}$ in. Starting, lighting and ignition is Delco with Bendix drive on the starter and a Willard battery.

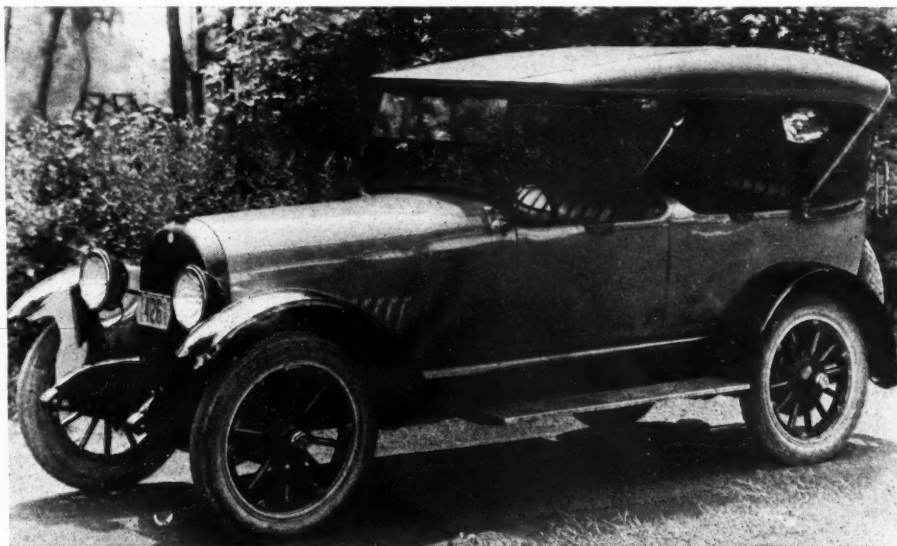
Model 76 is painted Mist O'Marne green with fine gold stripe and natural wood wheels. In designing the body a compromise has been made between the usual seven-passenger body and the four-passenger. Combined skill in design with the unusual body-building facilities of this concern has produced a six-passenger that is roomy and with the distinctive lines of all Stephens bodies. The seats are so arranged that five or six passengers can ride in comfort.

Among the additions to the equipment are Blakemore curtain openers, bullet lights, rear tonneau light, electric light under hood, new accelerator footrest, Johnston plate glass in the rear curtain, dash gasoline gage and oversize 33 to $4\frac{1}{2}$ tires. The price is \$1,850 f.o.b. factory. Production is now under way at Freeport, Ill. The company plans to build only a limited number.

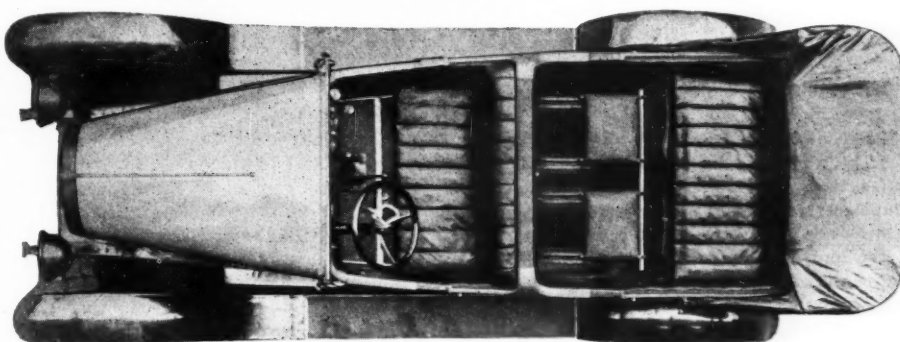
Tools for Straightening

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The application of heat is the most important thing to watch. Certain parts of the frame must be left cool to act as a brace while the other parts are bent back. For instance, if a frame channel is bent on the face and part of one cheek, as in Fig. 6, heat should be applied to the part inclosed by the dotted line, so the lower portion will act as a brace to make the bend. The most frequent type of frame straightening is that accompanying front



Stephens six-passenger car, which is offered at \$1,850



Airplane view of Stephens six-passenger, showing seating arrangement

end collisions, where one or both frame horns are bent to one side or down.

One way of straightening out a bent frame horn is shown in Fig. 1. The large straightening bar or wrench is used, or two wrenches operated by two men. Sometimes an iron rod the same diameter as the spring bolt fitting the eye can be used, but if the link pin housing is bronze it is better to use the two wrenches to get leverage.

Still another method is to clamp an iron or steel bar to the side of the horn, passing the bolt through the opening in the end of horn. Then a large wrench is placed on the bar and the end of the wrench swung in the direction shown by the arrow, Fig. 1. In all this work it must be borne in mind that the parts must not be bent cold. In fact, they cannot be bent cold. Heat must be applied; it makes the job easier and puts less strain on the metal.

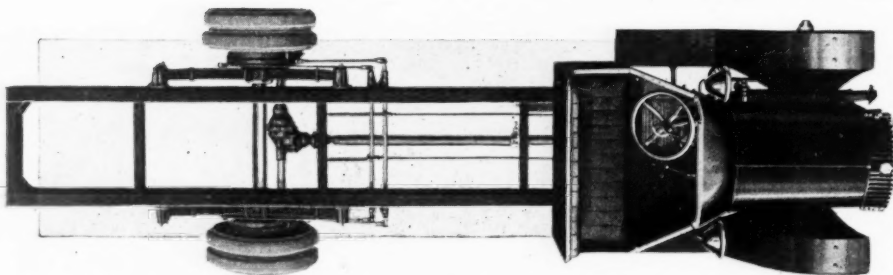
If a badly bent frame comes in it is better to shear the rivets holding it together and bend the parts separately. This applies to cross members, etc. The whole frame need not be taken apart, but only those portions requiring attention. Cross

members can be straightened much better on the straightening table and then riveted in place again. Heat only each portion of the bend and straighten one portion at a time, finally truing up the whole job with the finishing tool, as shown in Fig. 3.

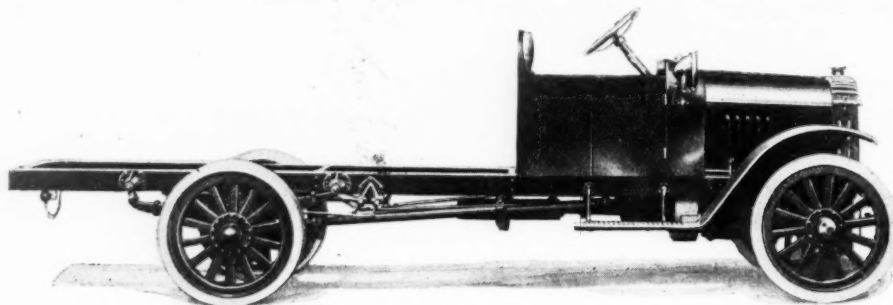
After the frame horns are bent back to the proper positions they should be tested for alignment. One way of doing this is to run a rod through the bolt holes or spring link housings, if the bend is on the rear end. The rod should pass easily through the holes, being of the same diameter. If the rod has to be driven in, it shows the holes slightly out of line. This can be checked up further by measuring the distance from the rod to the rear cross member near each end. Another way of measuring the accuracy of the job is shown in Fig. 5 at the bottom. Here a straight edge has been placed on top of the frame and a spirit level placed on it to make sure the frame is resting parallel. A rod then is slipped in the bolt holes and the level placed on the rod. Both sides are tested and if found correct the job can be considered right.

Delivery Ready on Bethlehem Line

Three Models Are Offered in 1½, 2½ and 3½-ton Capacity



Airplane view of Bethlehem chassis, which is identical in design for all three



Side view of Bethlehem truck, which has been redesigned throughout

THE truck line developed by the Bethlehem Motors Corp. is ready for deliveries. The three models, D-1, E-1 and F-1, 1½, 2½ and 3½ tons respectively, have been entirely redesigned and are equipped with electric starting and lighting. Other features are radiators with cooling fins on the top and a driveshaft steady bearing to keep the driveshaft from whipping.

Part sizes differ in each type; but in design the three models are identical, the parts merely being proportioned to the work they are built to do. Model D-1 and E-1 engines are identical, except for the cylinder bore, which on the 1½-ton is 3¼

in. and on the 2½-ton 4 in. The stroke is 4½ in each case.

The crankshafts are 3½ per cent nickel steel, ground and hardened. The cylinders and pistons are ground to close limits and the valves are of the same material as the crankshaft. All bearings are interchangeable and readily accessible. The intake and exhaust manifolds are cast together and there are four hot spots, enabling the lower grade fuel to be used without any change in the carburetor. Standard equipment on the engines include Schebler carburetor, Monarch governor and Atwater Kent ignition system. The engine on the

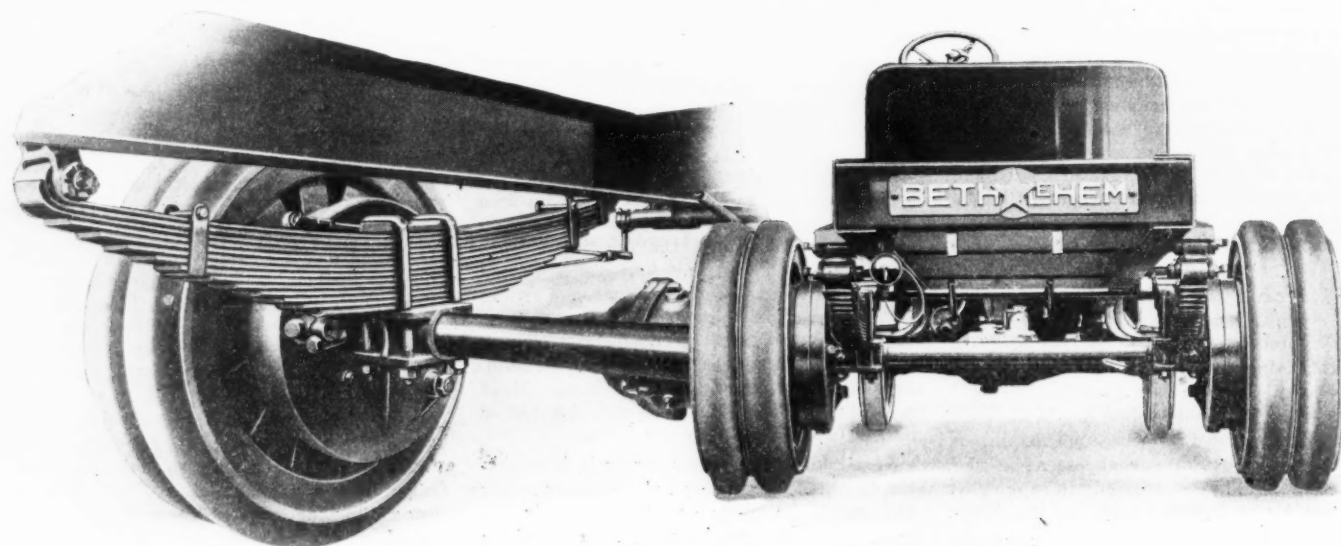
model F-1 has a bore of 4¾ in. and stroke of 6 in., and is similar in design to the others, the only difference being in the bore and stroke and the size of the parts.

All the models are equipped with Gray & Davis two-unit starting and lighting systems with Bendix drive to the flywheel and a Willard storage battery suspended in a mounting identical with that adopted by the Government and used on the Liberty trucks. All wiring is of brass armored type and all wires are clipped at intervals not exceeding 18 in. The storage battery also supplies the ignition current.

The radiators are of Fedders make and are armored. The top and bottom tanks are bolted on and can be removed if necessary. Cooling fins are provided on the upper tank and the name "Bethlehem" and a star are displayed prominently on the front of the top tank. Thermo-syphon system of water circulation is employed and the lubrication of the engine is by a gear pump, which maintains a constant level.

Clutches and gearsets are identical in the different models except for size. The clutch is of the two-plate dry type, requiring no adjustment or lubrication. Lubrication of the thrust bearing is taken care of by the hollow driveshaft. All gears and shafts in the gearset are of chrome-nickel steel, hardened and ground and mounted on ball and roller bearings with the exception of the countershaft on model D-1, which is mounted on a bronze bearing.

The propeller shafts are made of steel tube, 2½ in. in diameter on the smaller models and 3 in. in diameter on the large model. They are of the floating type, as the propeller shaft floats between conical springs and fits itself in the position best adapted to the truck in which it is used. All propeller shafts are equipped with a Barker propeller shaft steady bearing,



View of Bethlehem truck, showing spring pad and brake construction, left, and rear view of truck, right

which prevents whipping of the shaft by supplying a bearing at the center of the shaft, this bearing being held in place on slides with springs so that it can move as the axle and frame move in relation to each other, but the springs are of sufficient strength to prevent shaft whipping.

The rear axles are of the internal-gear-drive type and have no welds in their construction. Differential gears and pinions are of chrome-nickel steel, hardened and ground, as are the jackshafts. Both packshafts and differentials are mounted on adjustable annular bearings.

Two sets of brakes are provided, the service set being external contracting and the emergency set being internal expanding. Both sets operate on the rear wheels direct and both are double acting.

The wheels are of artillery type with fourteen spokes front and rear, all wood parts of second-growth hickory and hubbed up under pressure. Any standard make of tires can be furnished, the sizes being as follows: 1½ ton, front 34 by 3½ in., rear 34 by 5 in.; 2½ ton, front 34 by 4 in., rear 34 by 6 in.; 3½ ton, front 34 by 4 in., rear 34 by 5 in. dual.

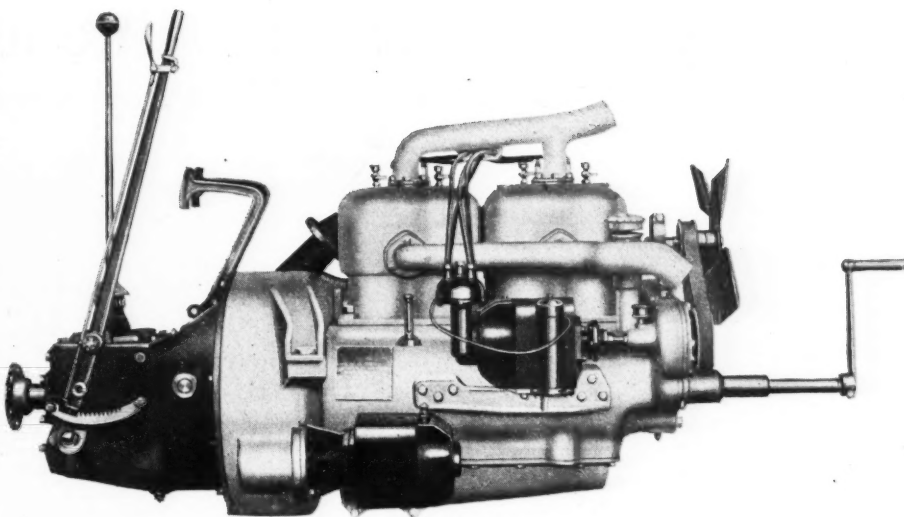
Drop Forged Axles

The centers of the front axles are chrome-nickel steel, drop forged in one piece with no welds. The spring seats are forged integral with the axles as are the knuckles. The steering pivots are nickel steel and wheels are mounted on roller bearings, which are adjustable for wear. Hubs are semi-steel and steering yokes as well as knuckle pins are bushed.

The springs are specially adapted to the Hotchkiss form of drive and the main and second leaves are silico-manganese stock. Spring eyes are bushed with phosphor bronze and the clips are nickel steel. The spring shackles are of electric furnace steel and the bolts are nickel steel. Oil cups are provided for lubrication.

The frames are of cold pressed steel and all cross members and brackets are hot-riveted to the frame.

The comfort of the driver has been well looked after and the seats and backs have Marshall type springs, well tufted uphol-



Right side of the model D and E engine for the Bethlehem

stery and a contour that insures comfort. The seat is wide enough to accommodate three persons and the doors and cowl give protection in severe weather. The doors can be removed in hot weather.

The steering gear is of the worm and nut type, with ample provision for adjustment. The steering rim is 18 in. and the spark and throttle levers are mounted on top of the wheel. The steering gear is irreversible.

A standard express and stake bodies can be had for the two smaller models, these being finished in black enamel. Cab tops are mounted on the chassis and are provided with side and front curtains.

The chassis prices are \$1,765 for the 1½-ton, \$2,165 for the 2½-ton and \$3,265 for the 3½-ton model. These prices are for the chassis with cowl. The cabs are \$60 for any of the models, and stake or express bodies for the 1½-ton model are \$110, and for the 2½-ton model, \$130.

AMERICAN MOTOR TRUCK SOLD

Detroit, July 19—The American Motor Truck Co. was sold at auction recently by the Detroit Trust Co., receiver, at approx-

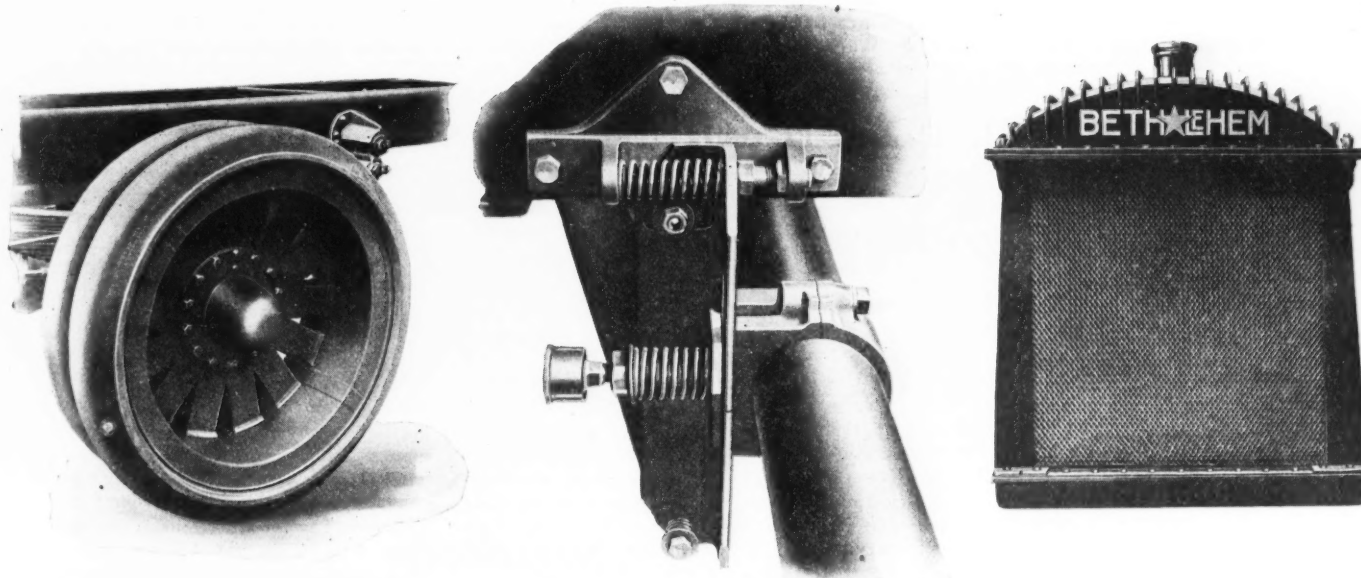
imately \$32,000. The personal property was sold in divided lots for \$22,000. The real estate, represented by an equity in a contract, was bought by Frank Brothers for \$10,000; the purchaser will assume payments on the unpaid balance. The book liabilities of the company total \$50,000. This does not include the unliquidated claims.

PACKARD TO CONTINUE SERIES

Detroit, July 19—Packard will continue its third series twin-six indefinitely. In its announcement of the continuation the company states that in a time like the present it feels the bringing out of a separate model merely for the sake of change and of slight improvement would not be warranted.

RANIER ADDS NEW MODEL

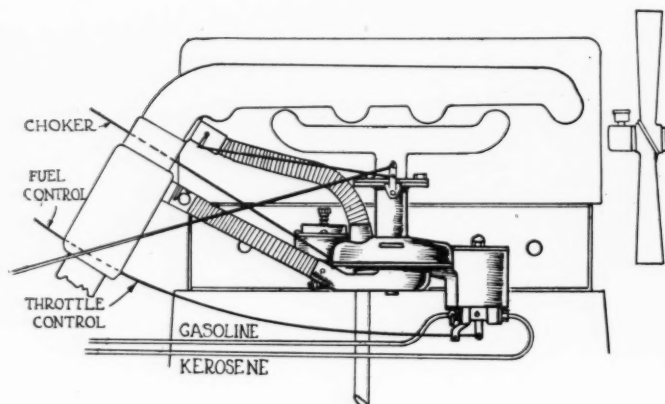
New York, July 19—The Ranier Motor Corp. will begin shipment on a new model known as the R-6, 2½-ton, which is listed at \$1,790 this month, the truck will be fitted with a Continental engine, 3½ by 5¼, and has 133-in. wheelbase. This makes four models for Ranier, the others being ½, ¾, and 1¼-ton.



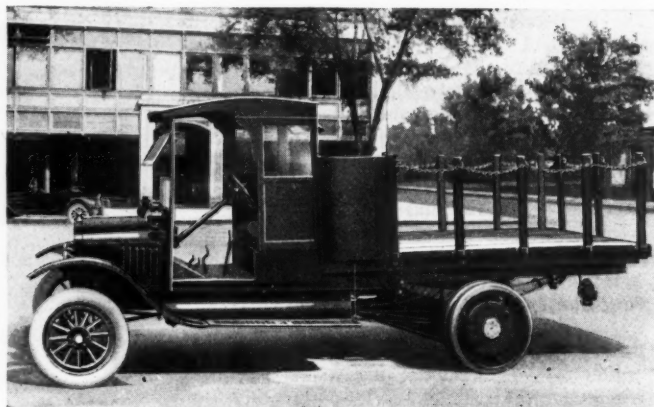
Rear wheel construction on 3½-ton Bethlehem, left; driveshaft steady bearing, center; and radiator

Carbureter for Kerosene and Fuel Oil

Trader Device Built to Operate Very Cheaply



Trader kerosene carbureter attached to engine



Olson unit for Ford cars in position

R. V. TRADER & CO., McKeesport, Pa., have developed a carbureter which they claim will operate successfully not only on kerosene but also on fuel oil, the cheapest liquid fuel known. The theory is that evaporation of kerosene or other heavy fuel depends upon three conditions, or three factors, namely, the surface over which the fuel is spread, the temperature and the rapidity of air circulation. In the following the effects of each of these three factors is gone into at some detail.

Speedy evaporation may be secured by spreading the fuel over a very large surface exposed to the air. This readily will be understood when it is reflected that a certain quantity of kerosene in an open test tube will lose very little by evaporation in a given time, whereas if the same quantity of fuel were spread over a large surface, say 10 ft. square, it would evaporate almost instantly. The evaporation also may be accelerated by heating the fuel or the mixture of fuel and air or by preheating the air, but the temperature must necessarily be high.

Another way of speeding up the evaporation is to carry off the vaporized fuel as quickly as it is formed. This statement

easily may be verified experimentally by placing a pan with the fuel in a chamber where the air is motionless and another pan with fuel in a blast of air. The latter will be emptied of fuel much sooner, owing to the fact that the vaporized gases are carried away from the surface of the liquid fuel as rapidly as formed.

Evaporation in Trader

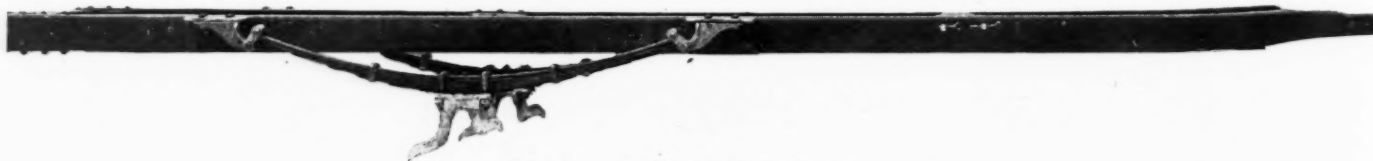
In the Trader kerosene carbureter an attempt has been made to meet these three conditions of rapid evaporation. The small quantity of fuel which is ejected from the nozzle at each stroke is spread evenly over the large surface of a rapidly revolving disk. It is heated by warm air which passes over the surface of the disk in a direction transverse to the motion of the fuel, thus carrying the gases evolved away rapidly.

The main air supply for this carbureter is taken from a stove on the exhaust pipe. The air passes from this stove into the throat of a small air turbine, where it is directed against the turbine blades, revolving the assembly of turbine motor disk and shaft. This warm air revolving in the turbine housing is in direct contact with the

disk and evaporates the fuel spread thereon by the nozzle; it then passes around the circumference of the disk over the circular exhaust-heated hot spot on the casing of the disk. The theory is that the combustible mixture passes this hot spot at such high speeds that it will not be appreciably heated, but should any drops of liquid fuel pass around the edge of the disk, owing to this greater inertia they would be thrown against the hot spot, where they would immediately be turned into vapor. The mixture enters the throttle passage way through a throat directed so that the air from the auxiliary air valve at high speeds surrounds the gas in its passage to the manifold.

The Trader kerosene carbureter should preferably be used with a cast-in manifold. A carbureter suitable for a four-cylinder, $3\frac{1}{4}$ by $5\frac{1}{4}$ in. engine at normal speed in truck service will have a disk speed of from 600 to 2800 r.p.m., and the disk area is 12.56 sq. in. The temperature of the air entering the main inlet is said to be about 200 deg. Fahr. at low speed and not much above 225 deg. at higher speed. Of course, the evaporation of the kerosene materially reduces this temperature.

Selden Extension for Ford Truck



Columbia extension for Ford 1-ton truck

THE Selden Mfg. Co. of Detroit is building a new extension for the Ford 1-ton truck. This extension, known as the Columbia, is built to take care of long bodies and extends the frame enough to put a 9 ft. body behind the seat.

The frame is of solid pressed steel, which is assembled on the Ford truck without any changes being made on the chassis other than those required by the direct assembly

of the unit. On this frame are a set of springs and patented brackets, which fit on the Ford rear axle housing flange and incase the Ford spring perch. These brackets can be put on by any ordinary mechanic without drilling any holes or disassembling the Ford wheels. The side springs are high carbon steel and are assembled on the Ford frame to take care of the light load.

By this arrangement the first 1000 lb.

rests on the auxiliary spring and the remaining 1500 lb. is taken up by the Ford spring. The Ford spring is built strong enough and is able to take care of 4000 lb. The extension is suitable for grocers and other tradesmen where a roomy truck is wanted. The length of the frame overall is 12 ft. 8 in. This frame is strong enough to take care of all types of truck-forming bodies and without changing any subsills.

Nelson Truck Offered in 2½-Ton Model

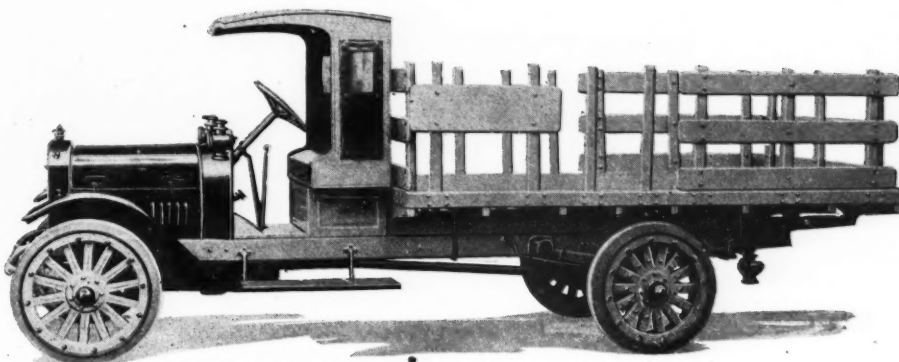
Bodies Will Be Made to Order by the Company

THE Nelson Motor Truck Co. was organized at Saginaw, Mich., this spring to make a 2½-ton truck, which will be marketed under the trade name Jumbo.

It has planned to build but one size truck, although future developments may alter this policy. The truck will list at \$2,250, the price covering a chassis with driver's seat, fenders, lamps, tools and solid tire equipment. The bodies will be made to order in the Nelson factory. The truck is equipped with a Buda model H-U 28-hp. S. A. E. rating powerplant, with internal-gear rear drive. It has a wheelbase of 144 in. and a standard tread of 56 in. front, 59 in. rear. The frame is pressed steel channel section of ¼-in. stock, 200 in. long, 34 in. wide and 5¼ in. deep, with four cross members. The wheels require 35 in. by 6 in. solid, single-type tires and are of Prudden manufacture, having fourteen square spokes 2½ by 2½ in. front and rear. The Buda powerplant is a four-cylinder design, with bore and stroke 4¼ by 5½ in. It is an inclosed flywheel type of three-point suspension.

Ignition is by fixed spark from an Eise-mann G-4, high-tension magneto. The carbureter is a Zenith, and lubrication is provided by pressure feeds to all bearings by a gear pump driven from the camshaft. Cooling is by centrifugal water pump put through a zigzag tube G & O radiator having a cast iron base with removable core. The governor is a Duplex, driven from both motor and driveshaft, governing engine and vehicle speed independently, in accordance with Duplex governor practice. The fuel feed is by gravity from the tank under the seat, the tank capacity being 13½ gal. The drive is taken through a Fuller dry-plate clutch of the multiple-disk type, lined with Raybestos. Transmission is also a Fuller selective sliding gear, having three speeds forward. The gears and shafts are made of 3½ per cent nickel steel and the entire box is mounted on ball bearings and is a part of a unit powerplant.

Final drive is through a propeller shaft with two universal joints to the Celfor internal-gear drive rear axle. The gear ratio



Nelson 2½-ton truck with stake body

provided is 8 to 1 on direct. The front bearings are Timken rollers, while the rear axle are Bower and Hyatt. The front axle is an I-beam construction and is a drop forged unit. Semi-elliptic springs are

used, 40 in. by 2½ in. front and 54 in. by 3 in. rear. Both brakes are on the rear wheels. The steering gear is a Jacox, fully adjustable, and the remainder of the control set is standard.

Olson 2-Ton Truck Unit

Converts Ford Passenger Car

THE Swedish Crucible Steel Co., Detroit, manufacturer of Olson units, is making a 2-ton unit installation of which converts the Ford passenger car chassis into a truck rated at 2 tons but really capable of handling satisfactorily considerable overload.

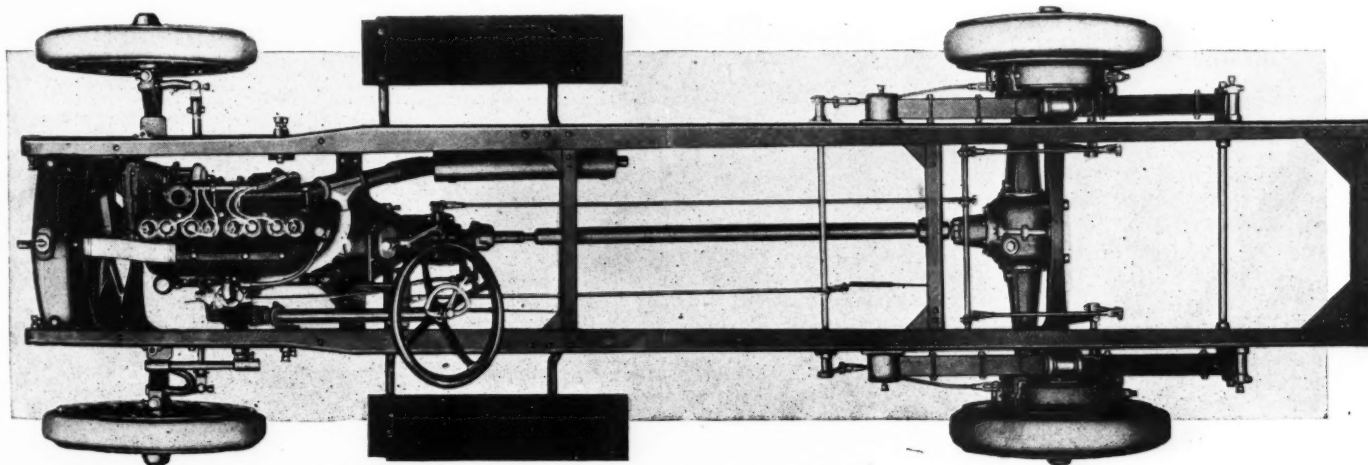
With the wheel equipment is furnished the Olson 36-in. driveshaft and frame extension, increasing the wheelbase to 136 in. This makes possible the mounting of commercial bodies of large size, the standard stake body having loading space of 5 by 10 ft. The illustration herewith shows the construction of the unit, the internal gear type drive being used, gear reduction giving final ratio of 10 to 1. The load is removed entirely from the Ford axle and borne by the set of large ball bearings mounted outside the internal gear. The bearings have a capacity of 7 tons per wheel. The wheels are steel of special de-

sign, made for the mounting of dual solid rubber tires either 28 in. or 32 in. by 3½ in.

Heavy auxiliary semi-elliptic side springs 52 in. long and 2¼ in. wide, of thirteen leaves, insure maximum strength and complete the equipment, which sells for \$550 f.o.b. Detroit.

TREGO ON ORDNANCE WORK

New York, July 19—The Trego Motor Corp., New Haven, Conn., which was given a contract to manufacture Liberty aircraft engines for aircraft purposes, has transferred its manufacturing activities from aircraft to the Ordnance Department. It will continue the manufacture of the Liberty engine, but for ordnance purposes. This company has gotten into production in a small way, but has facilities for approximately twenty-five engines per week.



Airplane view of chassis for Jumbo truck made by the Nelson Motor Truck Co.

The Accessory Corner

Midway Grease Cabinet

IN addition to its other accessory and garage equipment, the Midway company puts out portable grease cabinets, which are listed respectively style A and style C. The pump barrel of the former is $\frac{3}{4}$ in. and it is fitted with a hose $\frac{1}{2}$ in. and 5 ft. long, delivering per stroke $\frac{1}{4}$ lb. This type handles oil and semi-fluid grease. The pump of style C is $1\frac{1}{4}$ in. with hose $\frac{3}{4}$ in. by 5 ft., delivering per stroke $\frac{1}{2}$ lb. This type will handle all semi-fluid grease and the heaviest transmission greases. The container has 20 lb. capacity with handle and dust-proof cover. The valve casting has large grease openings controlled by a single ball valve. The baffle washer inside the container keeps the air from the pumps and practically all grease can be pumped out. Accuracy of the pump with various greases can be checked by weighing the cabinet before and after its use. Price, style A, \$7; style C, \$11.—Midway Mechanical Co., 1555 Selby avenue, St. Paul, Minn.

Glass Spark Plug

In the construction of the new Flash glass spark plug the glass is pressed and locked solid within the shell and is of heaviest insulating material. The sparking points are of heat-resisting nickel and will not pit, corrode or burn, it is said. The plug radiates light and heat and shows by flashlight color rays the true mixture of gas in the cylinder, blue for good mixture, yellow for poor mixture. A cylinder with carbon deposit also is shown by this method. Heat, cold and water spray do not affect the plug, it is claimed. It is made in $\frac{1}{2}$ in. standard, $\frac{3}{8}$ in. S. A. E. Price, \$1.25.—Long Brothers, Kokomo, Ind.

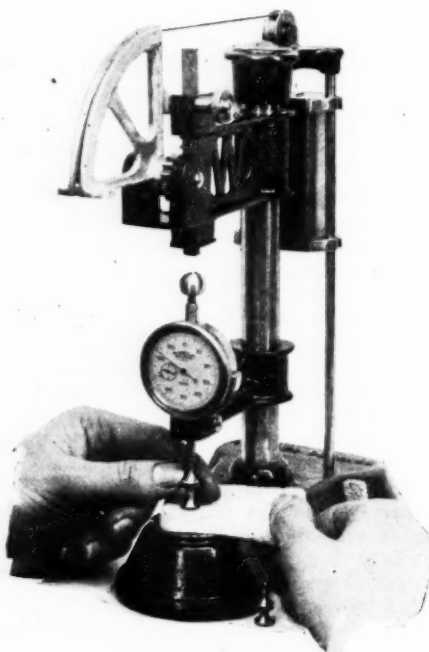
Iowa Unit for Dodge

The Iowa unit for the Dodge Brothers' chassis comes in $1\frac{1}{2}$ and $2\frac{1}{2}$ -ton constructions. Specifications of the $1\frac{1}{2}$ -ton are as follows: Axle internal gear drive with all driving mechanism inclosed, gear ratios $5\frac{1}{2}$ to 1, 6 to 1 and $6\frac{1}{2}$ to 1. Driveshaft is 2 in. tubular four-point. The springs have 10 leaves, 54 in. long by $2\frac{1}{2}$ in. wide. The

frame is of heavy 5-in. steel channel, corners reinforced with steel plates and heavy cross members, hot-riveted throughout. The wheelbase is 140 in., and the wheels are of the artillery type with twelve spokes $1\frac{3}{8}$ in. square fitted with 32 by 4 in. solid tires. The $2\frac{1}{2}$ -ton differs in that the axle parts are larger in proportion to the load. The gear ratios are 7 to 1 and 8 to 1. The wheels have fourteen spokes 2 in. square and the tires are 34 to 4. The springs have twelve leaves and are 3 in. wide. Price, \$500 for the small size; \$600 for the larger.—Iowa Motor Truck Co., Ottumwa, Iowa.

Three-Wheel Dolly

This three-wheel dolly is a turntable and jack combined. It is claimed that a Ford touring car can be raised with one hand with it. The device weighs 60 lb. and its construction, as shown by the illustration,



Widney patent Resiliometer

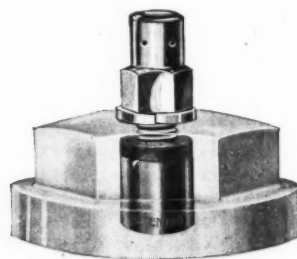
demonstrates how quickly it acts. Price, \$15.—Garage Equipment Co., 241 Fourth avenue South, Minneapolis, Minn.

Gas-Tank Seal

The Imperial gas-tank seal has been tested thoroughly by the Armour Institute of Technology and the Associated Engineering Laboratories and the results are said to show that all waste of gasoline through the vent hole can be stopped by equipping a car with the seal. The device works equally well with gravity or vacuum systems and is so simple it cannot get out of order. The valve admits air automatically, to replace gasoline through the carbureter. It is installed by boring a $\frac{3}{8}$ -in. hole in the filler cap. Price, \$3.—Imperial Brass Mfg. Co., 1200 West Harrison street, Chicago.

Resiliometer

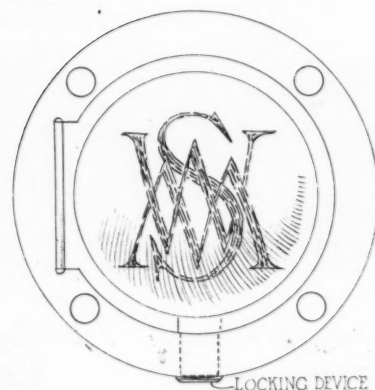
The Widney patent Resiliometer is an instrument which guides the purchaser and user of mechanical felt, rubber or resilient material for packings, gaskets, or bumpers, where a certain hardness or resiliency are essential features. The device affords accurate means for measuring the exact thickness, hardness and resiliency. It is in effect the combination of a direct-reading dial type micrometer gage with a device whereby both the hardness and the resiliency of the material can be determined accurately to the smallest degree. It consists primarily of a dial underneath which is a presser foot touching a perfectly level base on which rests the material to be



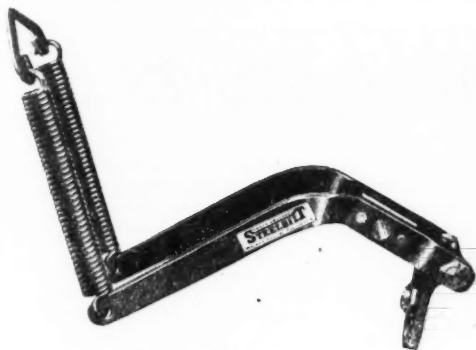
Imperial gas-tank seal



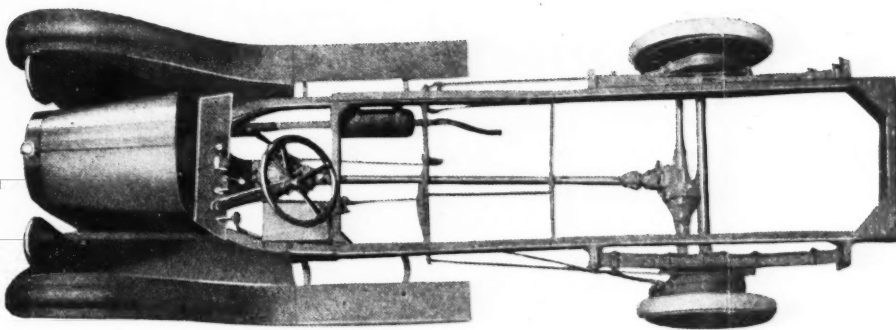
Three-wheel dolly, combination jack and turntable, for Ford cars



Protective monogram for cars



Walker Steelbilt shock absorber



Iowa unit for Dodge Brothers chassis in position

tested. Making sure that the quadrant, which holds the weight descending from it, is drawn up and held by the spring catch, the operator lifts up the presser foot and inserts the material to be tested. Each revolution of the hand is equivalent to an elevation of $\frac{1}{16}$ in. of travel of the presser foot and a smaller dial inside the large one counts the number of revolutions. Releasing the spring catch sinks the foot into the material, measuring its thickness under pressure. Release of the presser foot gives the resiliency. Price, \$150.—Widney Co., 320 South Jefferson street, Chicago.

Protective Device for Cars

An Oklahoma inventor proposes to protect cars from theft by using a monogram illuminated by an electric lamp as an identification device. According to his idea the monogram adopted by the car owner would be registered in the county clerk's office. When a car has changed hands legally a notation would be made on the record where the monogram was registered and the new owner could register at the same time a new monogram unless he desired to use the old one, which would be optional. In addition a title holder for carrying the abstract of title to the car would be locked in the dashboard as further protection. The idea back of the abstract is a bill of sale executed by the one selling to the purchaser, who should have the transfer noted in his abstract and same certified by the county clerk. The abstract



Flash glass spark plug



Midway portable grease cabinet

should include name, model, factory, engine, license numbers. For this to prove effective, of course, there would have to be state laws requiring the owner of a car to carry an abstract of title to his machine. However, the inventor expects to get into production very soon.—W. S. Marr, Enid, Okla.

Eccolene

Eccolene is a product for eliminating carbon from the engine at the same time increasing the mileage per gallon of gasoline. It is compounded from seven oils and when added to gasoline in a proportion of 1 to 2 oz. to 5 gal. of gasoline, according to the size of the engine, by chemical action it breaks up the gasoline coming through the carburetor and so transforms it that almost every atom will be burned. It is non-explosive and non-injurious to the engine.—Eccolene Co., Detroit, maker; Edward A. Cassidy Co., New York, distributor.

Walker Shock Absorber

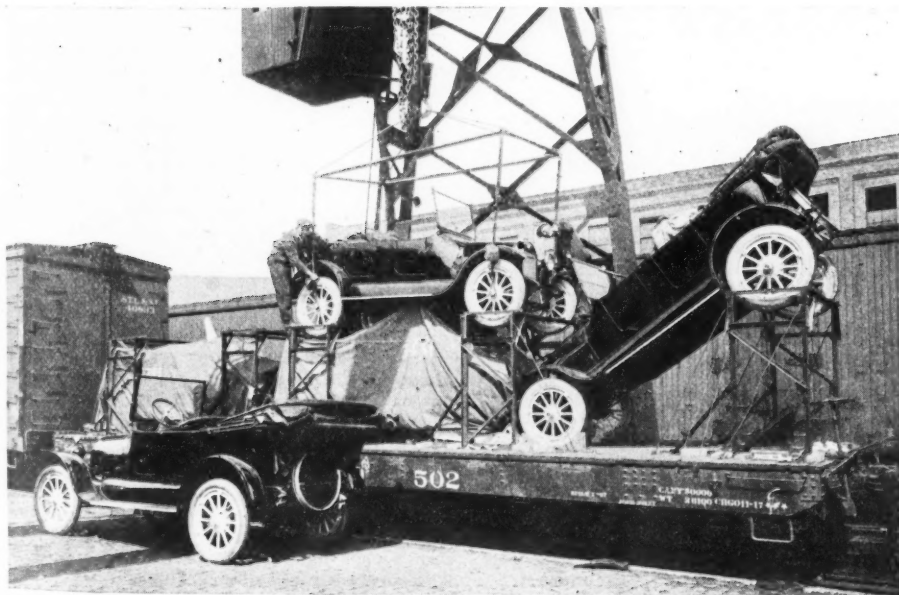
The Walker Steelbilt shock absorber for Ford cars comes complete ready to install and can be clamped on in a few minutes' time. No hole need be bored. The device is made entirely of steel and has no sliding parts. Proper suspension of long, strong oil-tempered springs prevents vibration and keeps the car body level on sharp curves or steep inclines, it is said. Price \$7.50 per set of four.—Walker Mfg. Co., 32 Hamilton street, Racine, Wis.

CARBO SHIPPING DECK

The Carbo steel loading and shipping deck is used to save freight space by various motor car makers. The device enables the shipper to load motor cars double decked in any height of freight car. The decks are interchangeable for any car, box, gondola or flat, and can be used for slanted decking also. All decks are provided with adjustments to clear the lower car with tires on, with tires off, with tires off and springs compressed, with wheels off and springs compressed. The deck is made by the Carbo Steel Products Co., Chicago Heights, Ill.

ILLINOIS DEALERS CALL MEETING

Chicago, July 22—The Chicago Automobile Trade Association has called a general meeting of all dealers in Illinois for July 30 at the Hotel LaSalle. The idea is eventually to have a state organization affiliated with the National Automobile Dealers' Association.



Carbo steel loading and shipping deck shown in use

Among the Makers and Dealers

BOENSCH Heads New York Branch—B. H. Boensch has been made manager of the New York branch of the Bearings Service Co.

Comet Now in New Plant—The Comet Automobile Co., Decatur, Ill., has moved into its newly constructed building and the construction of cars and trucks is being rushed.

Taft Is Promoted by Maxwell—I. O. Taft, who has been supervisor in the St. Louis zone for the Maxwell Motor Sales Corp., has been promoted to supervisor for that zone for Maxwell passenger cars and trucks and Chalmers cars.

Wilcox Working on Government Order—The M. I. Wilcox Co., Toledo, Ohio, manufacturer of radiator covers, is working on a Government order for tents at the new plant, No. 3, which is a three-story building with basement and contains 20,000 sq. ft. of floor space.

Chandler Adds Tractor Buildings—Plans have been completed and contract awarded for two more tractor buildings and the enlargement of two office buildings for the Chandler Motor Car Co. One building will be 44 by 220 ft. and the other 30 by 240 ft. The enlargement of the office buildings will double the floor space.

Warner to Direct Federal Production—Harry J. Warner, for twelve years with the Continental Motors Corp., Detroit, and for six years vice-president in charge of production, has been elected vice-president of the Federal Motor Truck Co., Detroit, member of the executive committee and board of directors with full charge of production.

Women Drive Tractors in Plowing—The first exhibit of the Fordson tractor in the vicinity of St. Louis, Mo., was given recently under direction of the Bagley Motor Co., East St. Louis, Ill., agent. Two St. Louis women who took the Ford training course in the assembly plant there, drove the tractors in the field. Many farmers witnessed the trials.

Davis Heads Grossman Mfg. Co.—Changes have been made in the management of the Emil Grossman Mfg. Co., Brooklyn, which makes Red Head spark plugs, Ever Good bumpers and other automotive equipment. H. W. Davis, who is vice-president of the Finance & Trading Corp., has succeeded Emil Grossman as president. K. P. Collins, who is also connected with the Finance & Trading

Corp., has been made vice-president, succeeding L. M. Schwarz.

Allen to Manage Braender Sales—J. E. Allen, for several years manager of the Chicago branch of the Braender Tire & Rubber Co., has been made sales manager. He will make his headquarters at the factory in Rutherford, N. J.

Woodin with Canadian Champion—T. C. Woodin has been appointed sales manager of the Champion Spark Plug Co., Windsor, Ont., having been engaged in both manufacturing and merchandising and for some time connected with the Willys-Overland Co.

Hyatt Opens San Francisco Branch—The Hyatt Roller Bearing Co. of Chicago has opened a branch office in San Francisco, Cal., from which Pacific Coast trade will be handled. A. W. Fisher will be in charge of the branch.

Berger with Gray Motors Co.—Fred Berger, formerly chief engineer of the Oakland Motor Car Co., Pontiac, Mich., and sales manager of the Muir Carburetor Co., later chief engineer of the Abbott Motor Corp., Cleveland, Ohio, has been appointed chief engineer of the Gray Motors Co.

Ketcham Is Cleveland Zone Manager—H. S. Ketcham, who has been sales manager of the manufacturers' division of the Bradfield Co., advertising agent, has been appointed zone manager of the Cleveland Tractor Co. for the New England territory and will have his headquarters in Boston, Mass.

Prest-O-Lite Concern for Boston—The Automotive Battery Corp. has been formed in Boston, Mass., to take over the service of Prest-O-Lite products in Boston and vicinity. James MacKenzie is president and general manager. He was formerly in charge of the Willard battery interests at Springfield, Mass. J. A. O'Donnell, manager of the Prest-O-Lite branch, still retains his position as representative of the factory in New England.

Notes for Fords to Be Bought—The Auto Investment Co., Detroit, has been formed by local business men to buy notes given for the purchase of Ford cars. Under the plans customers can purchase used Ford cars on liberal terms and provide the dealers the means of disposing of their customers' notes. Officers of the company are: President, Charles

R. Talbot, vice-president of the National Bank of Commerce; vice-president, Paul Meyer, general manager of the Detroit Sales Co.; secretary and treasurer, Maurice W. Fox, president of the Maurice W. Fox Co.

Bay City Sells Business—The Bay City Auto Body Co., Bay City, Mich., has sold its business to Amil A. Denz, who will continue the business under the same name. The company will not only manufacture commercial bodies but will also do all kinds of motor car repairing and painting.

Truck Plant Is Being Enlarged—The Noble Motor Truck Corp., Kendallville, Ind., has purchased a site of 10½ acres on which is to be erected a building which will add approximately 140,000 sq. ft. of floor space to the plant. The railroad spur already has been laid and building operations will begin soon. The Noble truck has been manufactured in only one size, the 2-ton, but as soon as the new addition is completed 1- and 3-ton trucks also will be turned out.

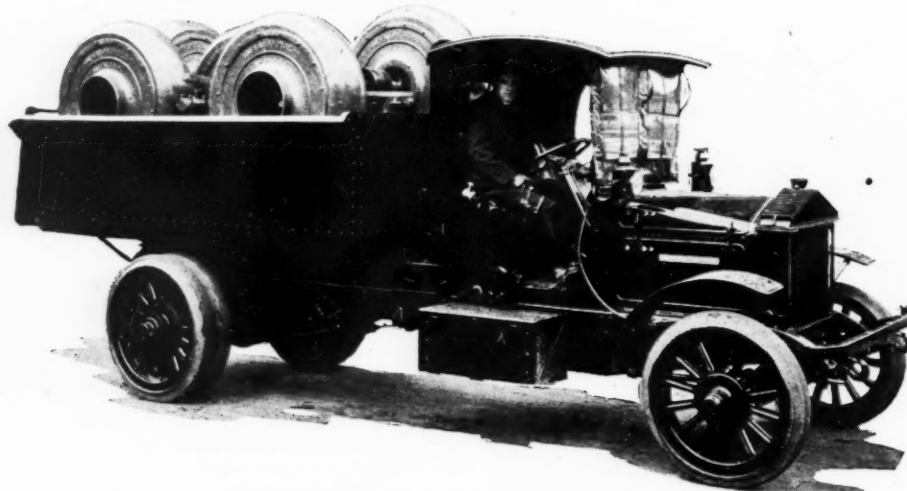
Republic Establishes Baltimore Branch—The Republic Motor Truck Co. has established a factory branch at Baltimore, Md., taking over the business of Habersham-Miller, Inc. L. Van Buskirk, formerly of the Studebaker Corp., is president and general manager of the reorganized company, Herbert L. Chacklack, vice-president, and A. J. Kenny, secretary-treasurer. All the men have been associated with Republic for some time. The local company retains its old name.

Gerlinger to Double Capacity—The Gerlinger Steel Casting Co., West Allis, Milwaukee, Wis., has started work on the construction of additions which will increase the capacity more than 100 per cent. The company has been operating an electric steel foundry exclusively for several years and has been engaged in steel foundry business for many years. The main addition will be 80 by 171 by 200 ft. and will be equipped with a new 5-ton Moore electric furnace.

Holmes Forming Truck Company—Milton A. Holmes, for four years sales manager and for two years vice-president of the Republic Motor Truck Co., Alma, Mich., is at the head of the Transport Truck Co., a \$1,000,000 organization which is being formed at Mount Pleasant, Mich. A committee was appointed to investigate Mr. Holmes' proposition. Plans call for two buildings, each 700 ft. by 80 ft. wide. The size of the truck to be manufactured has not been officially announced.

Louisville Tire Dealers Stay Open—Contrary to previous announcement that they had adopted the recommendations of the War Economy Board regarding service during the continuance of the war, the tire dealers of Louisville, Ky., are keeping their stores and shops open as usual at nights and on Sundays. Two of the tire dealers withdrew from the agreement and the rest followed. One of the dealers stated that when he signed the agreement to close he understood the gasoline stations also would close. When he learned they were not included he withdrew. The majority of the tire dealers in Louisville favor closing.

State Tours for Used Cars—The Decatur Auto Exchange, Decatur, Ill., which makes a specialty of handling used cars only, has found it profitable to place two men on the road whose sole duty is to tour the state and buy second-hand cars, particularly Fords. The constantly growing shortage in new cars has vastly increased the demand for used cars, and the firms that handle such cars ex-



TRUCK CARRIES BLOWERS OVERLAND—Though there is nothing so unusual about a truck going from Buffalo, N. Y., to Falls River, Mass., there is about the load. A 5-ton Pierce-Arrow carried five Buffalo volume exhausters on the trip

clusively are finding that the war is not without some redeeming feature. The Decatur firm has found some customers among dealers at other points. Unable to find second-hand cars at home to fill orders from their customers, they are coming to Decatur and making their selections.

Chevrolet Declares Quarterly Dividend—The Chevrolet Motor Co. has declared its regular quarterly dividend of 3 per cent, payable Aug. 1 to stockholders of record July 15.

Rapid-Change Wheel Is Formed—The Rapid-Change Wheel Co., Grand Rapids, Mich., has been incorporated with a capitalization of \$50,000. The company will make a new device which is a supplemental hub for motor cars. The officers are: President, John S. Noel; vice-president, J. Seman; secretary, Louis Dolan; treasurer, H. Hagen.

Davis to Build Testing Shop—The Davis Mfg. Co., Milwaukee, the gas engine division of the Avery Co., Peoria, Ill., has awarded contracts for the erection of a new testing shop, which will incorporate a shipping building and will be 63 by 199 ft. The new shop is being erected over the present testing building, which will be razed. This arrangement will make it possible to maintain operations without interruption.

United Motors Opens in Boston—The United Motors Service, Inc., Detroit, has leased in Boston, Mass., and has opened a service station for owners of cars and trucks equipped with Remy, Delco and Klaxon systems. It also will operate a bearings service station for machines using Hyatt, Timken and New Departure bearings. Harry A. Monaghan, for some years in charge of the New England branch of the Warner lens interests, will be manager.

Hayes-Ionia Expands Plant—The Hayes-Ionia Co., Grand Rapids, Mich., has just completed a three-story addition, 248 ft. by 110 ft., to its plant. It was only a short time ago that the company took over the plant erected by the Nelson-Matter Furniture Co., moving its general offices from Ionia, Mich. The plant at Ionia is still in operation. More than 1700 men are employed in the two factories,

which have a floor space of over 600,000 sq. ft. The company was organized in Ionia in 1910 to manufacture motor car bodies, but has since expanded into the making of sheet metal parts as well.

Griffin Heads Kerosene Equipment Sales—J. M. Griffin has been appointed sales manager of the Kerosene Equipment Co., Detroit. He was formerly with the General Electric Co., Schenectady, N. Y., and later with Holley Bros., Detroit.

Ayling & Reichert Adds to Foundry—The Ayling & Reichert Co., Toledo, Ohio, is completing an addition to its foundry department. Although the chief business of the company is to manufacture plumbing supplies, it will now be in a position to make brass, aluminum, copper and bronze castings of every size and description.

Federal Press Steel to Add—The Federal Pressed Steel Co., Milwaukee, Wis., which is devoting much capacity to the manufacture of shells for anti-aircraft guns and other munitions, will build a new machine shop, 100 by 252 ft. The project involves an expenditure of more than \$125,000 in buildings and equipment.

Toledo Screw Gets Shell Order—The Toledo Screw Product Co., Toledo, Ohio, has received another order for 1,000,000 1-lb. shells, complete, for the Navy. The contract, with other Government work on hand, will necessitate the erection of a \$50,000 machine shop, 150 by 32 ft., adjoining the present plant. Work on the addition is to begin immediately. The company has made nearly 4,000,000 shells since 1914.

Janesville Machine Co. Reorganizes—The reorganization of the Janesville Machine Co., Janesville, Wis., manufacturer of farm machinery, under the direction of General Motors Corp., which recently acquired the controlling interest, has been completed. The capital stock is \$2,250,000, divided into 12,500 preferred and 10,000 common shares. The former capital was \$750,000. Officers have been elected as follows: President, J. A. Craig; first vice-president, A. P. Lovejoy; second vice-presi-

dent, G. V. Sullivan; treasurer, M. G. Jeffris; secretary, E. B. Davis.

Packard Declares Dividend on Common—The Packard Motor Car Co., Detroit, has declared a cash dividend of 2 per cent on common stock, payable July 31 to stockholders of record July 15.

Drake Heads Wayne War Board—J. Walter Drake, president of the Hupp Motor Car Corp., Detroit, has been appointed chairman of the Wayne County War Board, succeeding A. A. Templeton, resigned.

Michigan Drop Forge Declares Dividend—The Michigan Drop Forge Co., Pontiac, Mich., has declared the July dividend of 20 cents per share upon the common stock, payable Aug. 1 to stockholders of record July 15.

General Motors Buys Missouri Site—The General Motors Corp. has purchased a plot of ground amounting to 105 acres at St. Louis, Mo., and it is stated will build a considerable number of its bodies in a plant to be erected.

United Motors Service Expands—July 1 the United Motors Service, Inc., which operates six branches in as many prominent cities and fifteen service stations in as many other cities, took over all the field service work of the manufacturers of the Delco, Remy and Klaxon electrical equipment. General offices of the company have been moved into larger quarters.

Cleveland Building First of Four Units—The newly organized Cleveland Smelting & Refining Co., Cleveland, Ohio, has broken ground for its first unit, which will be a storage building, 60 by 140 ft., to cost in the neighborhood of \$20,000. Three other buildings, each 60 by 120 ft., will be erected later. These will be a refining room, blast furnace and copper room.

Stiles Heads Liberty Accessories—Jack Stiles has been made president of the Liberty Accessories Corp., St. Louis, Mo. Mr. Stiles has been identified in the past with various prosperous manufacturers in the motor field, but is now backing his own success—a siren signal for cars. In St. Louis alone over 5000 were sold in ten days. This device has been described in a previous issue of MOTOR AGE.

Akron, Ohio—Merchants' Auto Dispatch Co.; capital stock, \$15,000; incorporators, H. C. Batchelder, W. G. Harris, M. H. Rigle, D. W. Mason and L. I. Moore.

Alliance, Ohio—Non-Skid Co.; capital stock, \$10,000; incorporators, H. D. Lewis and W. C. Daniels.

Brooklyn, N. Y.—Eureka Auto Products Corp.; capital stock, \$100,000; incorporators, Arthur D. Middleton, George B. Glover and John F. Mason.

Chicago—Northwest Auto Sales Co.; capital stock, \$10,000; incorporators, E. H. Forke, R. C. Fritsch and W. L. Wenger.

Chicago—Juliet Auto Sales & Garage Co.; capital stock, \$5,000; incorporators, F. V. Healy, E. V. Peterson and A. V. Carney.

Cleveland, Ohio—Cleveland Lexington Motor Co.; capital stock, \$10,000; incorporators, L. A. Dunham, Don R. Sipe, S. W. Sangster, L. L. Livingston and C. N. Bowen.

Cleveland, Ohio—Ralph Motor Sales Co.; capital stock, \$25,000; incorporators, N. C. Ralph, M. Geibricher, Thomas Fricker, J. L. Smith and L. M. Nock.

Columbus, Ohio—Central States Motor Co.; capital stock, \$25,000; incorporators, Henry B. Albright, Daniel J. Hallissy, Raymond Grant, Lillian C. Toland and A. V. Sawyer.

Continental, Ohio—Continental Tractor Co.; capital stock, \$100,000; incorporators, Will H. Lowe, Charles T. Hunt, Charles Varner, S. D. Hensel, E. F. Dillinger, L. F. Knall, G. E. Coleman and C. E. Wright.

Cleveland, Ohio—Cleveland-Lexington Motor Co.; capital stock, \$10,000; incorporators, Don R. Sipe, S. W. Sangster, L. L. Livingston and C. N. Bowen.

Douglas, Ariz.—Arizona Auto Accessory Co.; capital stock, \$20,000; incorporators, H. B. Sisk and Charles R. Scott.

Dubuque, Iowa—The Liberty Tractor Co.; capital stock, \$300,000; incorporators, Edgar Jerome, Paul Klumb and W. J. Klumb.

Dover, Del.—Liberty Sole & Tire Co.; capital stock, \$250,000; incorporators, K. W. Brier, Charles Unverforth and James J. Crawford.

Henderson, Tex.—Henderson Motor Co.; capital stock, \$10,000; incorporators, T. B. Mayfield, W. E. Norvell and Homer Harris, Jr.

Recent Incorporations

Isabel, Okla.—Isabel Auto Co.; capital stock, \$15,000; incorporators, H. C. Newton, D. C. Flenniken and N. Roberts.

Little Rock, Ark.—Automotive Service Co.; capital stock, \$10,000; incorporators, F. L. Oiler, H. R. Oiler and R. D. Oiler.

Milwaukee, Wis.—Marsh Motor Truck Co.; capital stock, \$15,000; incorporators, A. J. March, August Schmidt and Carrie M. March.

Madison, Wis.—Madison Machine Tool Co.; capital stock, \$25,000; incorporators, E. J. McEachron, Thomas C. Olson and E. A. Fuller.

Milwaukee, Wis.—William H. Krueger Motor Co.; capital stock, \$5,000; incorporators, William H. Krueger, Clara Krueger and Julian Olds.

Milwaukee, Wis.—Nash Motors Co.; capital stock, \$250,000; incorporators, A. P. Conman, Jr., and Oscar W. Leser.

Milwaukee, Wis.—Service Auto Spring Co.; capital stock, \$9,000; incorporators, Charles P. Morden, Jr., and Jacob Widmeyer.

Norwalk, Ohio—Big Garage Co.; capital stock, \$99,000; incorporators, A. J. Reamer, C. F. Johnson, Fred W. Cook, J. F. Henninger, B. B. Wood and W. R. Pruner.

Phoenix, Ariz.—Mac Airless Tire Co.; capital stock, \$100,000; incorporators, E. Pomeroy, H. S. Standage and John T. Reese.

Phoenix, Ariz.—Phoenix Motor Co.; capital stock, \$50,000; incorporators, Y. L. Holmes and R. C. Greth.

Philadelphia, Pa.—Storage Battery & Appliance Co.; capital stock, \$150,000; incorporators, William Knoblock, Donald G. Scott and William J. Graham.

Portsmouth, Ohio—Oakland Garage Co.; capital stock, \$5,000; incorporators, H. E. Frowine, William L. Cook, Emma K. Butcher, Catherine B. Hofner and Mable L. Knost.

Philadelphia, Pa.—Kinrossing Garage Co., Audubon, N. J.; capital stock, \$25,000; incorporators, J. A. Belsio, George W. Miller and Frederick G. Blessing.

Saginaw, Mich.—Central Foundry Co.; capital stock, \$10,000; incorporators, T. S. Merrill, H. H. Rice and H. L. Barton.

South Bend, Ind.—Victory Tractor Co.; capital stock, \$250,000; incorporators, Elmer Sefton, Frank Hamilton, F. D. Henzie, W. S. Reed, Lester McCullough and Roy C. Kanouse.

San Angelo, Tex.—Buck-Cox Auto Agency Co.; capital stock, \$10,000; incorporators, Walter Buck, J. B. Cox and L. B. Cox.

Santa Fe, N. M.—Phelps-Dodge Supply Co.; capital stock, \$25,000; incorporators, W. A. Hawkins, J. W. Puckett and Charles A. Austin.

Springfield, Ill.—Washington Auto Sales Co.; capital stock, \$5,000; incorporators, P. M. Kwentus, J. M. Merrick and E. E. Luke.

Trenton, N. J.—United Auto Supply Stores, Inc.; capital stock, \$50,000; incorporators, Raymond H. O'Connor, Gertrude O'Connor and Florence Kenny.

Toronto, Ont.—Prest-O-Lite Co. of Canada, Ltd.; capital stock, \$800,000; incorporators, H. A. Harrison, W. M. Cox and R. E. Laidlaw.

Wilmington, Del.—Consolidated Motor Truck Co.; capital stock, \$50,000; incorporators, C. L. Rimlinger, M. M. Clancy and F. A. Armstrong.

Waupun, Wis.—Meiklejohn Garage Co.; capital stock, \$50,000; incorporators, James W. John, Alice and Aggie Meiklejohn.

Windsor, Ont.—Saxon Motors Corp., Ltd.; capital stock, \$50,000; incorporators, A. R. Bartlett, H. L. Barnes et al.

Wilmington, Del.—Paddock Rotating Cylinder Gasoline Engine, Inc.; capital stock, \$350,000; incorporators, Ferris Giles, E. W. Haslam and E. Lemon.

Youngstown, Ohio—Service Motor Truck Co.; capital stock, \$50,000; incorporators, H. A. Wiley, William Lewis, O. R. Cubblison, Alfred Howell and Mary A. Wiley.

From the Four Winds



SAILORS AND SAMMIES IN CAMP—Both of these views are from training camps in California. The sailors are at San Pedro, on tide land fills, where motor trucks cannot go, so they have to do their own hauling

CHAMPAGNE Christens Fire Truck—Probably the first time a motor truck was christened after the manner of a ship, by having a bottle of real champagne broken across its "bow," was on the occasion of the formal placing in service of a new combination fire truck for the fire department of Reading, Pa.

Pennsylvania Considers New Trunk Road—A highway association in Pennsylvania to arrange for a highway to be part of a trunk road extending through Philadelphia, Harrisburg, Pittsburgh, Wheeling, Zanesville, Columbus, Cincinnati, Lexington, Elizabethtown, Bowling Green, Hopkinsville, Benton, Mayfield, Union City, Duersburg, Memphis and on through Arkansas, Texas, New Mexico and Arizona to California is being considered. The route proposed is similar to that adopted in 1916 by the William Penn Highway Association. The idea is to have the proposed highway carefully marked and widely advertised to obtain traffic.

Pennsylvania Putting \$500,000 in Roads—Seventeen sections of state main highways, most of them on much-traveled roads over which Army trucks continually are passing and which will aggregate about 75 miles, have been designated by State Highway Commissioner J. Denny O'Neil for improvement under the \$500,000 appropriation by the state defense commission for war emergency roads. Five of the sections of highway upon which there has been the heaviest motor truck traffic are being resurfaced with bituminous mixed materials. The Lincoln highway in Adams county, between Gettysburg and Littlestown, is undergoing repairs. Some resurfacing is being done in Germany township, near Littlestown, and south of Johnstown, in

Cambria county, a portion of route 52 is being resurfaced. This road is Johnstown's outlet to the Lincoln highway. Several bridges are being built on this route.

Pennsylvania Registration Past 325,000—It is expected that fully 350,000 Pennsylvania motor car license tags will be used this year, as the department at Harrisburg is issuing No. 325,000. The order for 1919 will be the biggest ever issued—for 400,000—to be of black enamel with red lettering and a space for the manufacturers' number. They will be similar in general conformation and style to those now in use. In late years the tags have been furnished by the State prison commission, which has manufactured them at the shops of the Huntington reformatory. Highway Commissioner J. Denny O'Neil has issued notice that motor car and motorcycle license plates discolored with oil, grease, dirt, or from any other cause, or bent so that the numbers

cannot be plainly seen, will not be tolerated in Pennsylvania.

DuPont Airplane School Is Dismantled—The Delaware Aeronautic Co., financed by the DuPonts, has dismantled its plant at Claymont and has given the equipment, including several flying machines, to the West Side Y. M. C. A. in New York. Some months ago the Claymont establishment, which is along the Delaware river, was fitted up at a cost approximating \$150,000, and probably 100 embryo aviators were trained there.

York Would Be Motor Truck Hub—A committee of the York, Pa., chamber of commerce is planning to make that city a hub for a truck transportation system to radiate to Philadelphia, Baltimore, Washington, New York and eventually Chicago and other cities. Maps already are being prepared which will show the number of trucks, their schedules and rates in the general scheme. The committee also is considering arranging to assist transcontinental trucks.

Motorists Want Detours in Condition—Motorists traveling between New York and Washington through Wilmington, Del., are up in arms over the failure of local county authorities to make adequate provision for detours while the Wilmington and Philadelphia turnpike is being rebuilt. As this condition will exist for several months, a campaign has been inaugurated here to rectify the trouble. There are enough side roads and connections to take care of the traffic, but some of them are in horrible condition, and the traffic over them is making them worse all the time.

One Daily Delivery Saves—The one delivery per day plan for retail stores advocated by the War Industries Board and adopted in thirty cities has enabled them to operate with a saving of 40 per cent in motor trucks. Eliminating the return of merchandise to not more than three days, reducing the amount returned, elimination of special deliveries and the single daily delivery plan has combined to produce this result. In the thirty large cities the truck driver and helper organizations have been reduced 35 per cent. In thirty small stores in several towns in one eastern state the number of truck drivers and helpers has been reduced from 116 to fifty-five.

Concrete Roads Advocated in Philadelphia—Virtually every line of industry and retail trade in Philadelphia, Pa., is interested in the action of the Philadelphia Board of Trade in renewing its movement for a national system of motor truck highways through the congested section of the East. The suggestion made by the municipal affairs committee of the board is that a system of concrete roads be constructed from Boston to Washington. The report has been forwarded to all the councils of defense in the States along the Atlantic coast and to various organizations which have been asked to co-operate in urging Congress to adopt the idea as a war measure.

Dealers Help Club Get Members—Twenty-eight Baltimore, Md., dealers joined in a page advertisement in the newspapers boosting a membership campaign of the Automobile Club of Maryland. Half the page was devoted to a letter of John S. Bridges, who sets forth that there are only 2,500 motorists of Maryland, out of the more than 50,000 in the state, who are affiliated with the club. He also pointed out that all the benefits that motorists have derived in the state through good roads and fair legislation has been due to the efforts of the officers of the club.

Coming Motor Events

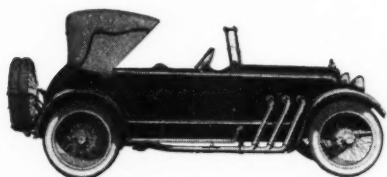
SHOWS

July 27—Syracuse, N. Y.
Sept. 2-7—Indianapolis, Ind.
Sept. 14-21—Chicago, Automotive and Accessories Exposition.
Oct. 14-27—Dallas, Tex.
Oct. 28-Nov. 2—Chicago, N. A. A. J.

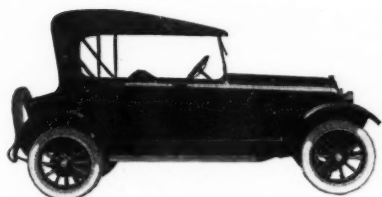
Nine
Superb
Models



Behind The Name Plate



Four-Passenger Sport Model



Two and Four-Passenger Roadster

BEHIND the name plate on the Velie you will find a car that meets every requirement—that has dependability, power, speed and comfort, all at a cost that meets the war-time need for economy.

In appearance the Velie is second to none. Beautiful lines, distinctive in finish and appointments. Every owner is proud of its permanent, mirror-like finish.

Red Seal Continental Motor, Timken Axles, front and rear, underslung springs, enclosed disc clutch—every feature one you *know* to be the best. Let the Velie show you quality and performance. Wire or write to-day if your territory is open—it is *your* opportunity.

VELIE MOTORS CORPORATION

Builders of Automobiles, Motor Trucks and Tractors

113 Velie Place

Moline, Illinois



Quality Automobiles, An Investment

TWO years ago automobile dealers faced what seemed likely to become a serious affair—that of disposing of Used Cars, taken in exchange on sales of new cars. Manufacturers, also, were concerned. Some felt we even were approaching the “saturation point.”

Today, used cars of high quality are eagerly welcomed by automobile dealers. The used car has become as necessary to the conduct of the automobile business as the new car—provided that the car is of high quality backed by reliable manufacture.

There are some 1916 models which—after two years of service—are selling for higher prices today than they sold for originally. These cars are Delco equipped.

A careful study of the re-sale value of cars, and the increase in re-sale values during the past year, shows that those carrying Delco

electrical equipment are selling for higher prices than many others.

We do not claim that the increased re-sale value is due to the fact that these cars have Delco equipment. But we do know that the manufacturer who is willing to spend the increased amount of money necessary for Delco equipment has also been willing to put into his cars a quality of workmanship and materials that makes for a good, durable performance.

THE plain facts reiterate that the first cost is not the most important thing, and that “Quality is remembered long after price is forgotten.”

The man who buys a Delco equipped car is not spending money, but making an investment—and the *interest* on his investment is represented by the increased re-sale value of his car.

The Dayton Engineering
Laboratories Company

Manufacturers of
Starting, Lighting and Ignition Systems
Dayton, Ohio, U. S. A.



Delco



When Writing to Advertisers, Please Mention Motor Age

STEPHENS

Salient Six

Equilibrium

BALANCE of weight and correct apportionment of power to load is worked out with as fine detail in the Stephens car as it is in the modern airplane.

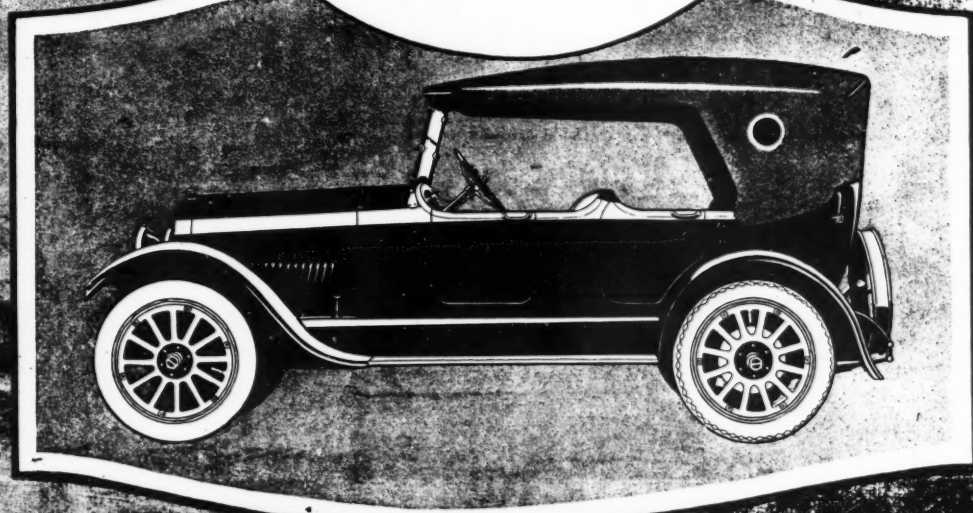
The Stephens "floats evenly" because its weight is scientifically distributed on its springs. It has ample power for every emergency because its small engine is highly efficient, the perfected overhead-valve engine which burns ALL the gasoline. Bore $3\frac{1}{4}$ inches; stroke $4\frac{1}{2}$ inches. Fourteen to eighteen miles on a gallon of gasoline with an actual fifty-seven horsepower.

FIVE MODELS

{	Three-Passenger Roadster
{	Four-Passenger Touring
{	Five-Passenger Touring
{	Five-Passenger Victoria
{	Five-Passenger Touring Sedan

Stephens Motor Branch
of Moline Plow Co., *Moline, Illinois*

Factory: Freeport, Illinois



EISEMANN

What Do You Know About Magnetos?

You have a preference, no doubt. On what is it based? The advertising? A comparison of structural excellence? Knowledge of actual performance?

The maker's statements may be a valuable guide if they present concrete, definite facts rather than impressive generalities.

The few individuals whose technical knowledge permits them to make comparisons of materials, design and workmanship, may draw interesting conclusions.

But for the majority, the service comparison is final and conclusive.

If you will investigate the merits of Magnetos on the basis of relative efficiency, durability and dependability, it is safe to believe that you will reach the conclusion which has led 126 manufacturers of trucks, tractors and cars—including most of the recognized leaders—to adopt Eisemann Magnetos as standard equipment.

THE
EISEMANN
MAGNETO-COMPANY

Sales and General Offices:

32-33d St., Brooklyn, N. Y.

Chicago:
910 So. Michigan Ave.

Detroit:
85 Willis Ave. W.

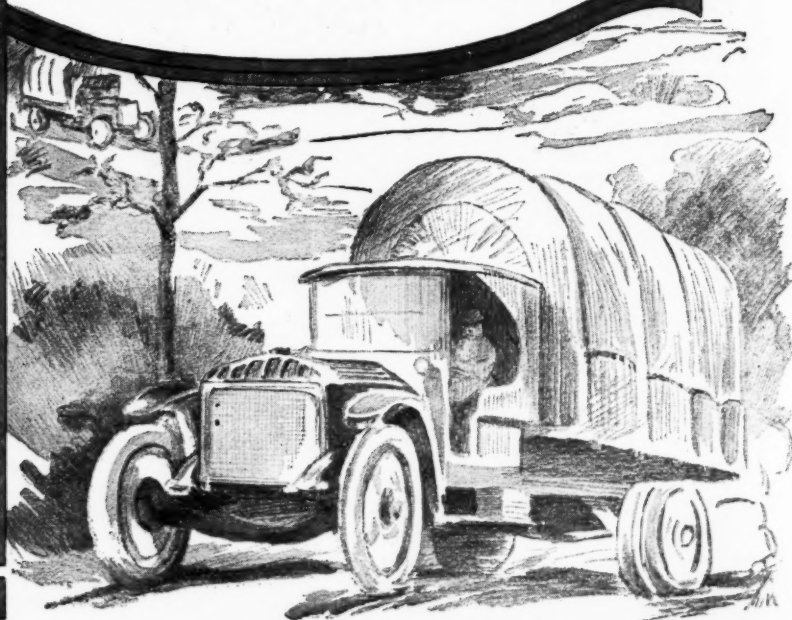
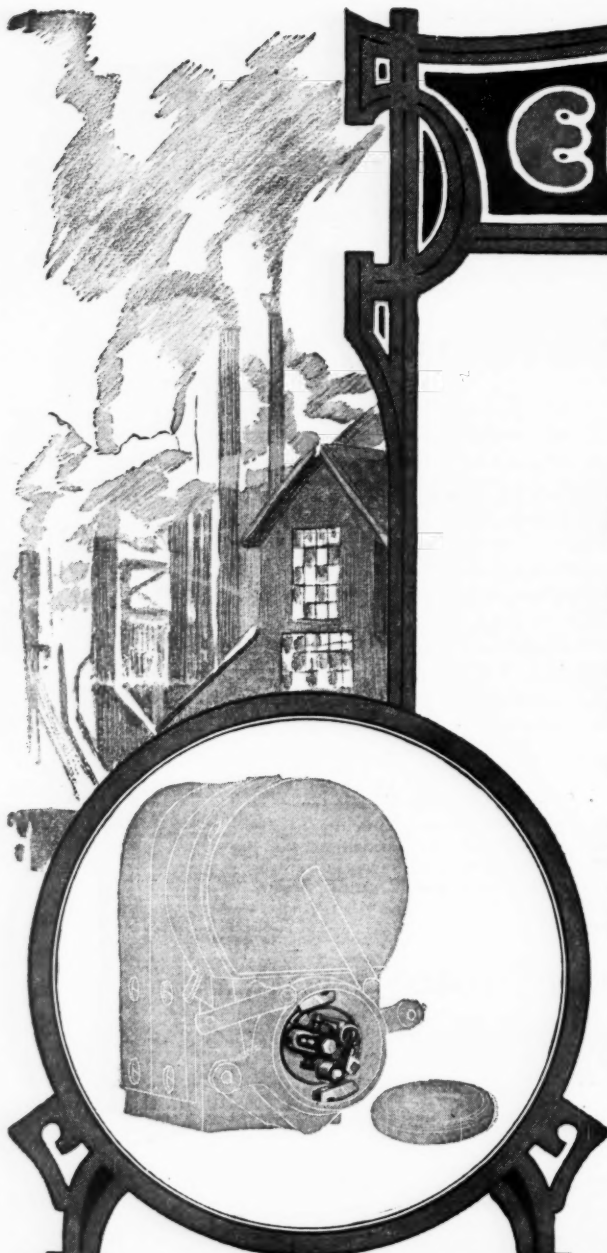
EISEMANN SUPER-CONSTRUCTION

4.—The Contact Breaker and the Condenser

At the moment the current in the primary winding of the Armature attains its greatest intensity, the Contact Breaker breaks the primary circuit and so develops in the secondary winding a high-tension spark of great heat. The Eisemann Breaker is simple, sturdy and compact, consisting essentially of a small disc fastened in a cone in the end of the Armature and revolving with it. This disc carries the mechanical and electrical elements on its outer face. The two platinum contact points—one carried by an insulated block fixed to the disc, the other by a rocker arm swinging on a self-lubricated bearing of exclusive design—are normally kept closed but are separated at the proper instant, twice in each revolution, by the sliding of the rocker-arm over flat steel cams in the timing lever body.

The Eisemann Condenser is the acme of efficiency because of extreme care in construction and of the high quality of the mica and other materials used. It may be depended upon to function perfectly in preventing the occurrence of a spark at the opening of the Breaker contacts, and in increasing the intensity of the spark at the Plugs.

Note, in the shadowgraph above, the relation of the Breaker to the Magneto as a whole.



When Writing to Advertisers, Please Mention Motor Age

WARNER

GEAR COMPANY OF MUNCIE, IND.

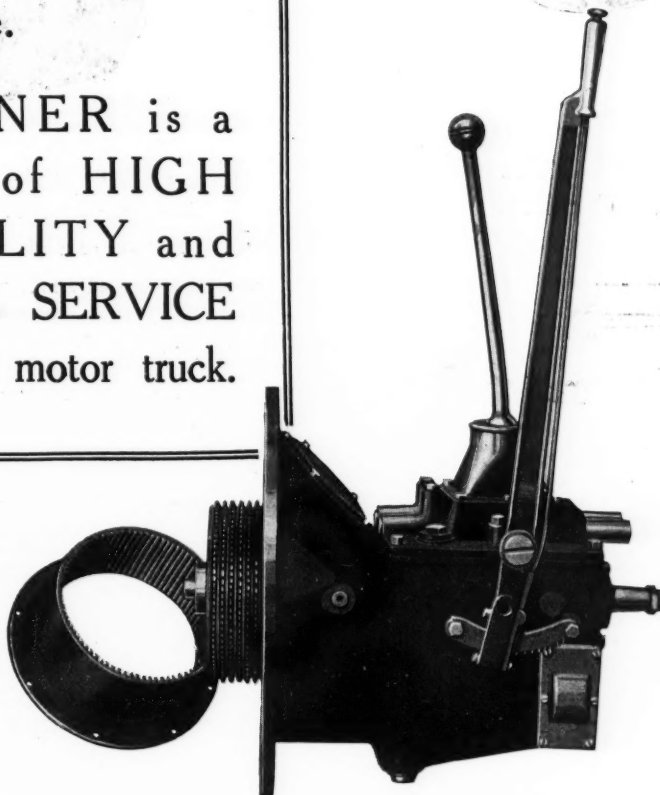
**TRANSMISSIONS
CLUTCHES**

**STEERING GEARS
DIFFERENTIALS**

If the trucks you handle are WARNER equipt they have a distinct selling advantage.

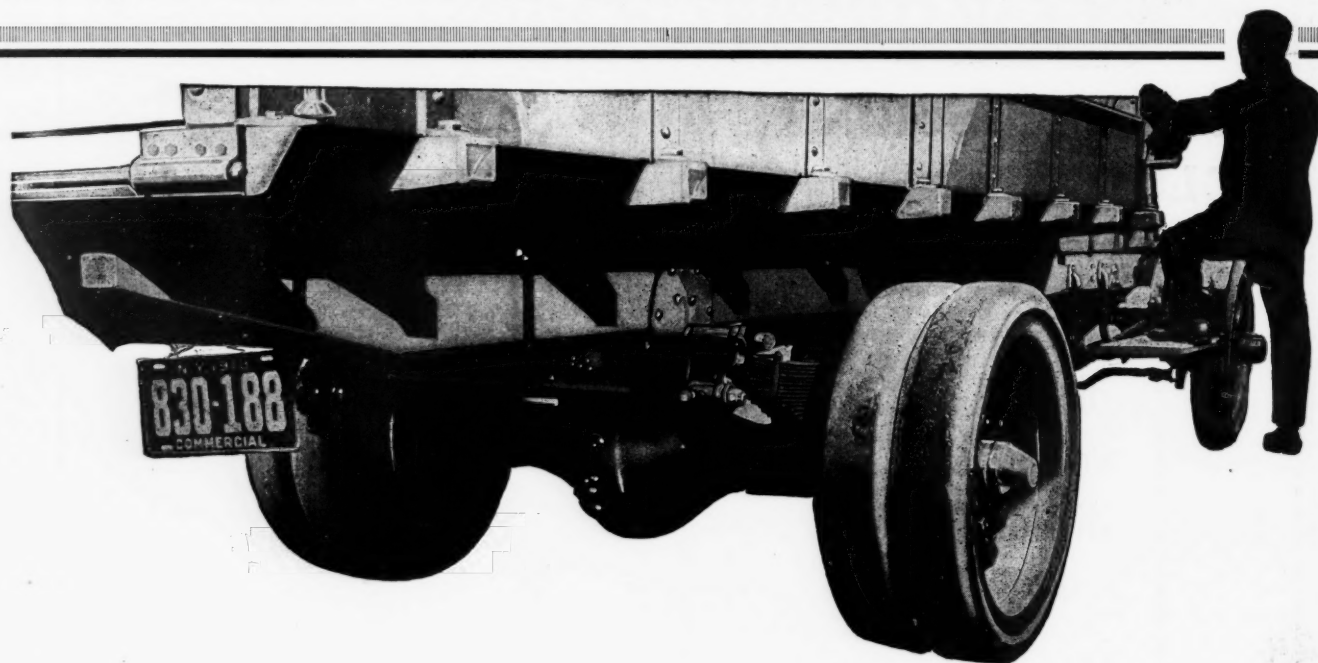
WARNER is a mark of HIGH QUALITY and LONG SERVICE in any motor truck.

**No Truck Is Better than
Its Transmission -
No Transmission Is
Superior to the
WARNER**

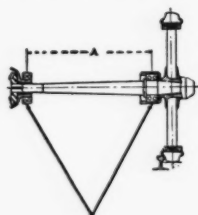


WARNER GEAR COMPANY · Muncie Indiana
Detroit Office - 967 Woodward Ave.

"It's when a truck is loaded to capacity, when the roads are bad, hills steep, mud thick, ruts deep and bumps plentiful, that the stamina of the rear axle is revealed."



THE SEMI-FLOATING CONSTRUCTION



Is more simple by reason of fewer parts, lighter for the same reason, yet has a greater carrying capacity than the full floating type. This simplified construction means greater accessibility, and its greater carrying capacity means greater economy of upkeep and operation.

The wheels in Sheldon Axles are mounted on extra heavy axle shafts which bear the dead load of the truck. In the full floating type the wheels are mounted directly on the much less dependable tubular extension of the axle housing—a construction in which any slight bend generally requires the expensive replacement of the entire axle housing.

SHELDON WORM DRIVE REAR AXLES

IT is the innate stamina of Sheldon Worm Gear Axles that forms the foundation for their increasing popularity with experienced users of motor trucks.

The ability to stand the punishment of long, hard service with the minimum of attention and repairs has long been a characteristic of the truck that bears Sheldon equipment. To-day that characteristic becomes doubly valuable.

Whether you manufacture, sell or use motor trucks the Sheldon Worm Gear Axle offers the surest guarantee of satisfaction from the standpoint of both service and economy.

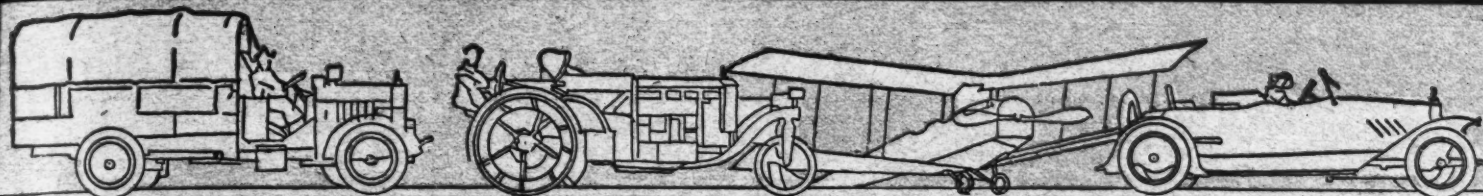
SHELDON AXLE & SPRING CO.



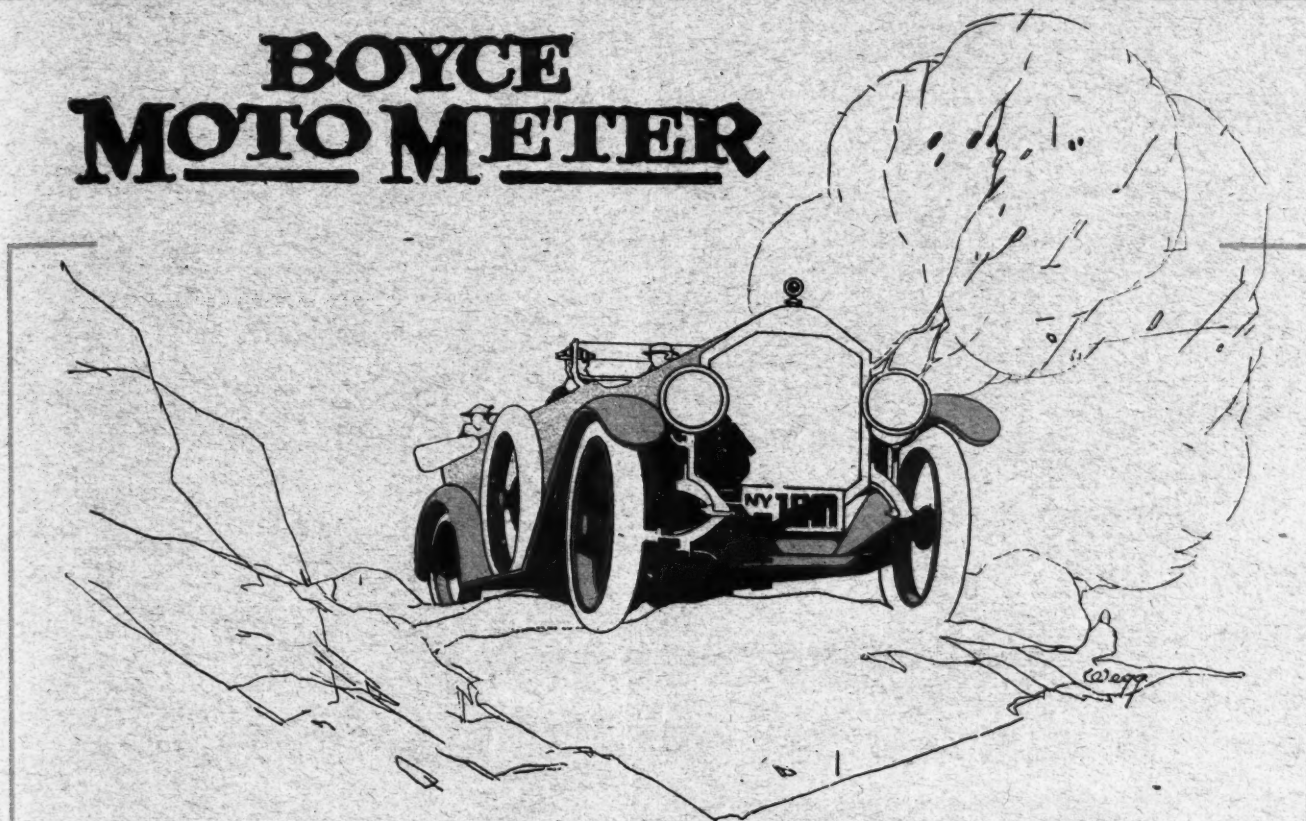
Makers of Springs and Axles for Heavy Duty Service for more than Fifty Years



WILKES-BARRE, PENNSYLVANIA



BOYCE MOTO METER



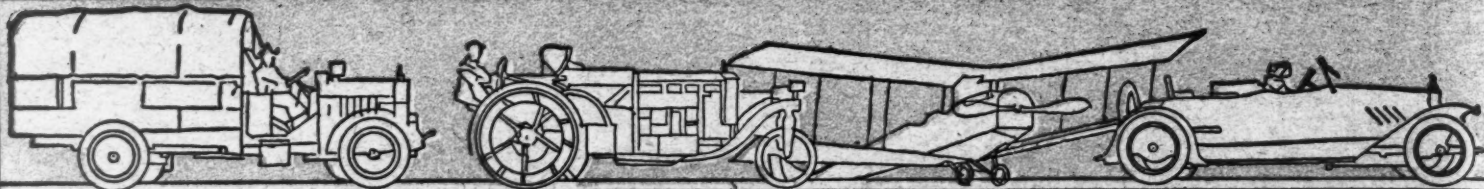
Safeguarding the Motor in War and Peace

NO single factor is contributing more towards winning the war than the gasoline motor. Like the vital fluid that carries the life-giving corpuscles through the blood-vessels, the motor vehicle conveys the vital essentials of food and ammunition through the myriad arteries that lead to the firing line. It makes of the army a living, breathing organism.

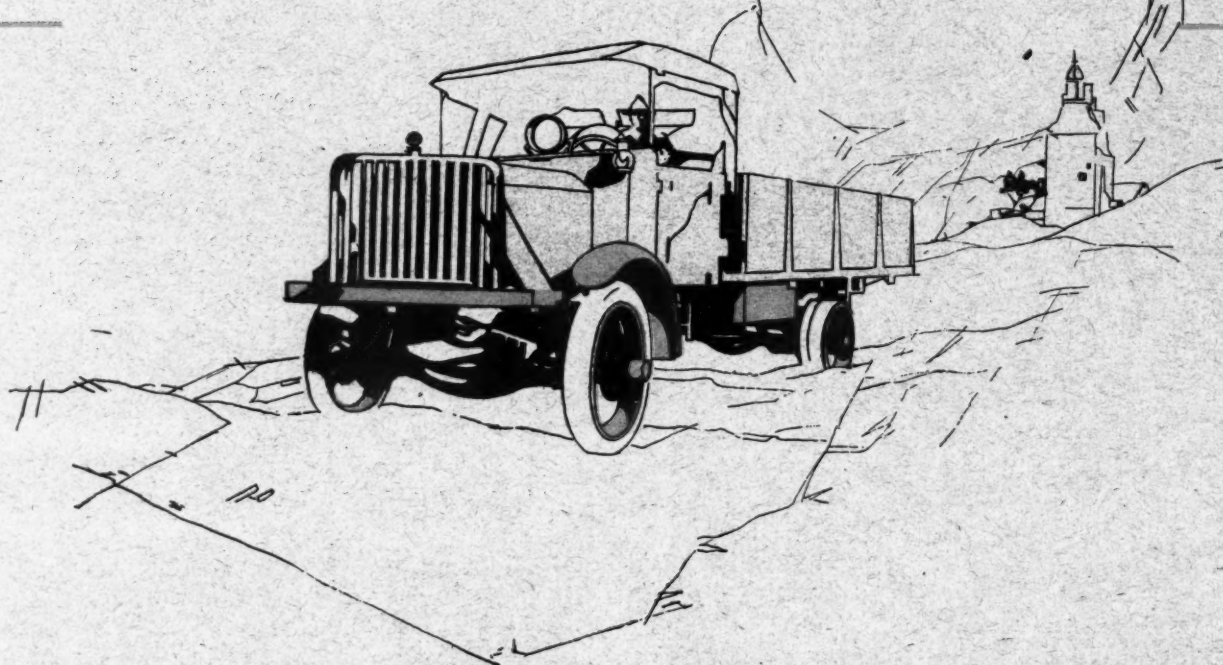
The gasoline motor, then, must be safeguarded—a function which has given to the Boyce Moto-meter a place of paramount importance in motor equipment. Without it serious accidents, due to overheating, are inevitable. And accidents mean delays, lost momentum—with their long train of evil consequences.

This was true even before the necessities of war demonstrated the economic value of the Boyce Moto-meter; for manufacturers of motor cars have long recognized its great utility. Which is the reason that, today, there are fifty-one distinct makes of passenger cars on which the Boyce Moto-meter is standard equipment.





BOYCE MOTO METER

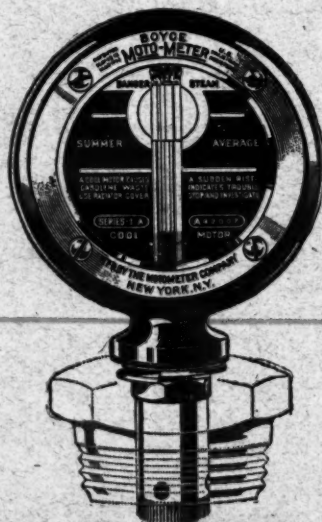


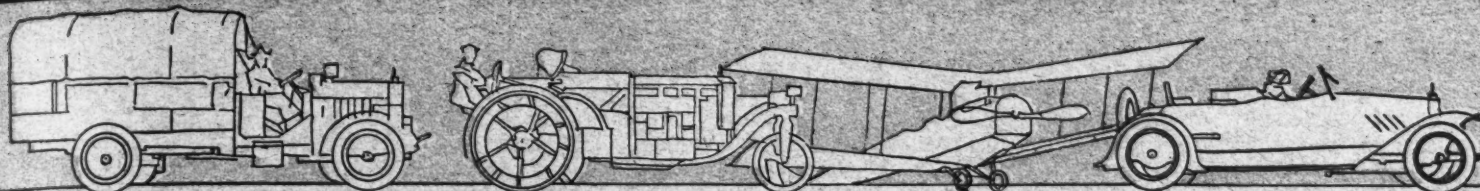
On Motor Trucks

A TRUCK laid up for repairs in times of war is a distinct liability—in times of peace a distinct economic loss. In either case a distinct handicap to efficiency. A truck motor, in the best of times, has a strenuous task to perform. The least oversight in the matter of water or of lubrication, the most trivial accident to a petcock on the crankcase—and such things are bound to occur—will start that hard-worked motor overheating. And then comes trouble—scored cylinders, burned out bearings and a host of other costly ills.

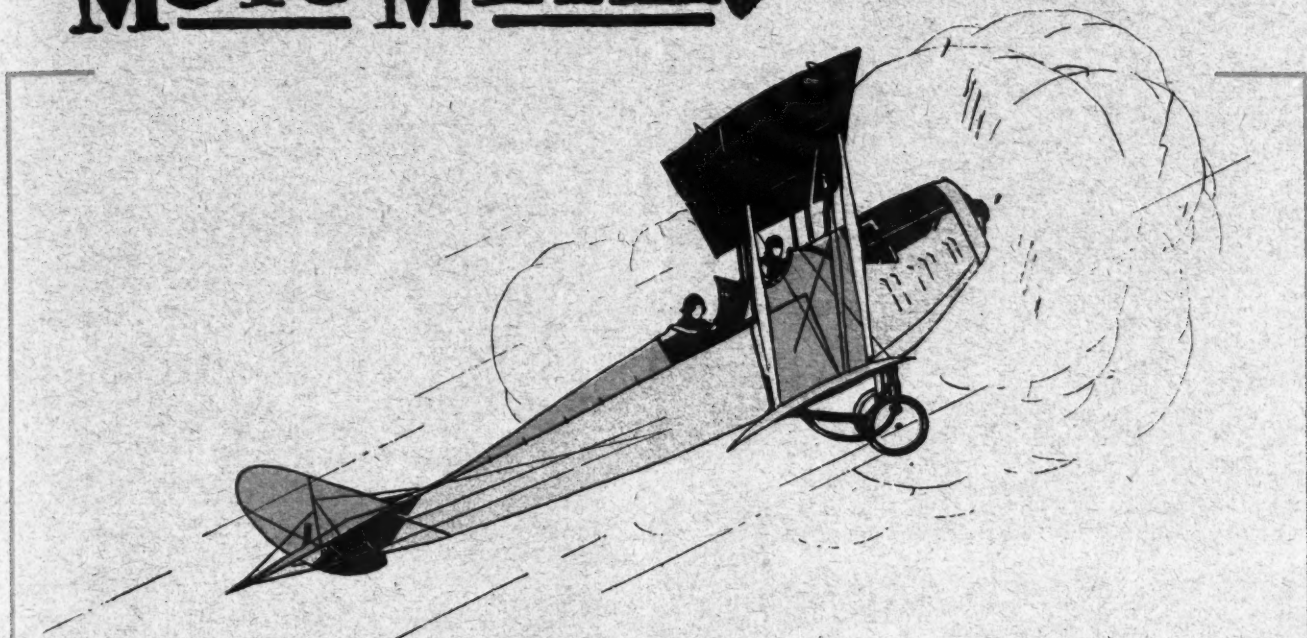
It is significant that all truck test runs are made with Boyce Moto-meters on the radiator caps, to give an accurate gauge of motor performance—and that already sixteen truck manufacturers have adopted the Boyce Moto-meter as standard equipment on their entire outputs. Three world-famous fire truck manufacturers have found it indispensable.

And it is indispensable wherever thorough motor efficiency—freedom from trouble—is measured at its true value.





BOYCE MOTO METER

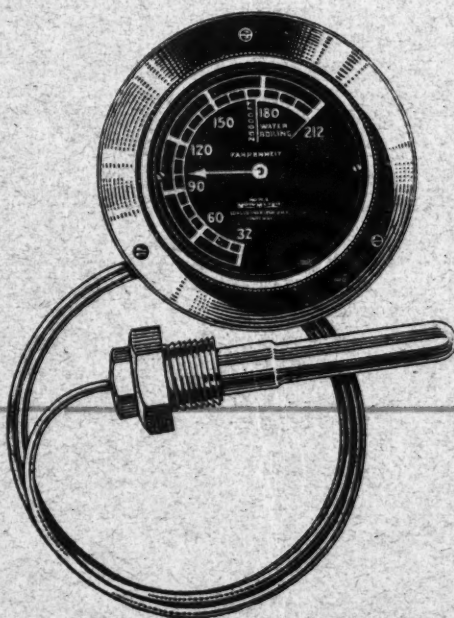


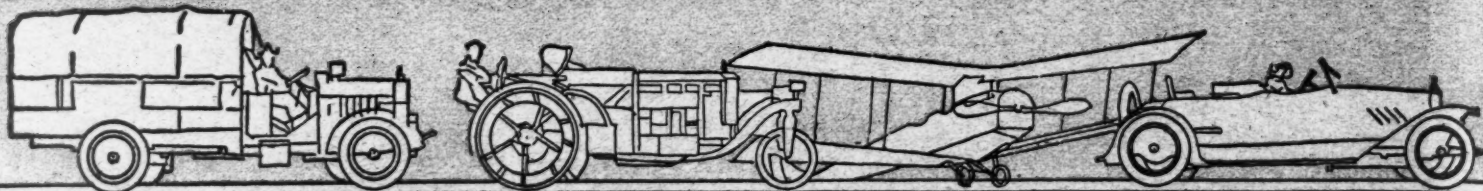
On Airplanes

AN army today is helpless—an impotent thing—without its eyes: its airplanes. Every airplane thrown out of commission because of a crippled engine means, until it can be replaced, that the army's vision is just that much impaired.

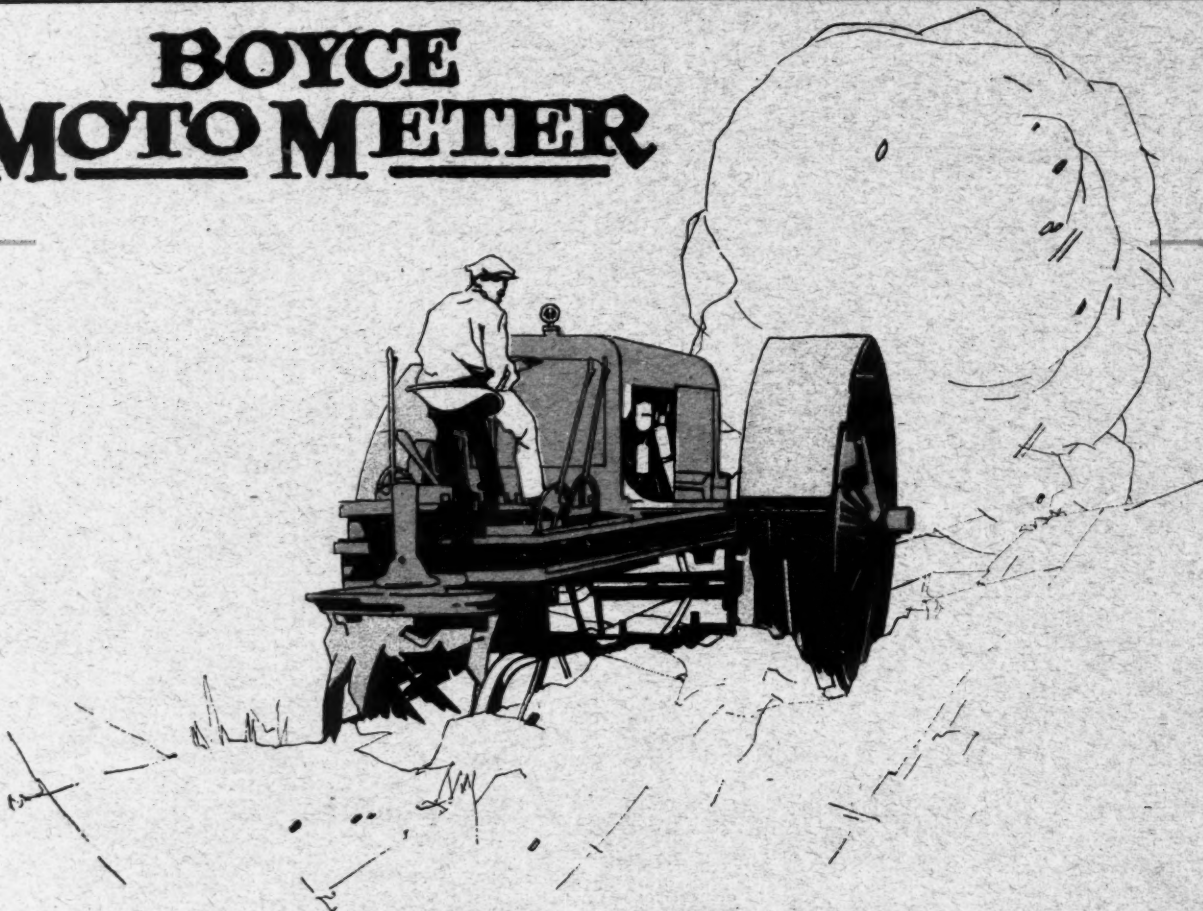
Soaring up into frozen altitudes, the menace of a stalled engine from sudden cooling is ever present—*unless a Boyce Moto-meter is there to give warning before the dreaded mishap occurs.* Or traveling at terrific speed at a lower level, how does the pilot know that his engine is overheating—perhaps to a point of extreme danger? His Boyce Moto-meter tells him: tells him in plenty of time to prevent disastrous results.

No airplane is safe without a Boyce Moto-meter—the only heat gauge that registers the entire range from freezing to boiling, and that records every change in temperature with unfailing accuracy.





BOYCE MOTO METER



On Farm Tractors

If food will win the war, it will owe its victory in large measure to the indefatigable farm tractor.

The tractor engine, more than any other, is constantly subject to overheating. It travels over no well-paved roads, but drags its burden over stones, ruts, hills and furrows—a never ceasing strain. An accident here is a direct blow to the nation and its armies—through their food supply—and no precaution can be safely dispensed with.

A Boyce Moto-meter is a positive necessity on tractors—the *only* absolute protection against the omnipresent danger: **OVERHEATING**.

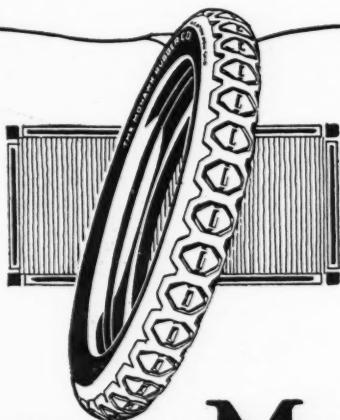
For years engineers have sought to visualize the perfect motor-driven vehicle—a dream that seems now to be rapidly approaching realization.

And the Boyce Moto-meter will be an inevitable accompaniment to this final triumph of engineering genius.

THE MOTO-METER COMPANY, Inc.
Long Island City, N. Y., U. S. A.



Mohawk
Keaton...
Tread....



Also made in
Non-Skid...
Ribbed and
Plain Treads.

Business Men will Understand Why Mohawk Tires Must be good

Every successful business man knows why one concern is able to give better quality or greater value than another.

They know that cutting away all mere selling talk and "business camouflage," when any concern, merchant or manufacturer gives extra high quality or big value you will find the real reasons are experienced men, good materials, and efficient methods, management and financing.

In Mohawk Tires you will find quality and mileage, which are not commonly found in tires.

The reason is because manufacturing conditions at the Mohawk factory are, we believe, more favorable for good tire building than you will find elsewhere in the tire industry. The men at the head of the organization are veterans in the tire business. The working conditions are so good that our workmen stay with us year after year, and put the best they know into each tire.

The factory is a model of efficiency, being one of the newest and best equipped plants in the business. The financing and management has always been conservative and sound. The company is not incumbered with a dollar's worth of bonded indebtedness—nor is the capital stock larger than our volume of business legitimately requires.

The materials used are the best rubber and fabric to be found the world over. Not that we have a corner on such materials, but the point is that because of efficient management and financing we are able to buy only these high quality materials and use a generous amount of them, instead of being compelled to experiment with dangerous substitutes and compounds in order to produce tires to sell at competitive prices.

If you are at all familiar with business management, you can easily see that tires made under these conditions must be extra good.

In some territories we want dealers. Contracts for exclusive territory will be given when dealers measure up to our requirements.

Mohawk Quality Tires Real Reasons for MOHAWK QUALITY

Good tire service depends almost as much upon the sales and service policy of the company as upon the quality of the tire itself. Mr. M. E. Mason, Mohawk Sales Manager, by establishing a fair square sales and service policy, has gathered an unusually high grade loyal body of dealers. The fact that you rarely find a dealer switching from the Mohawk line is the best proof that they find the proposition profitable.

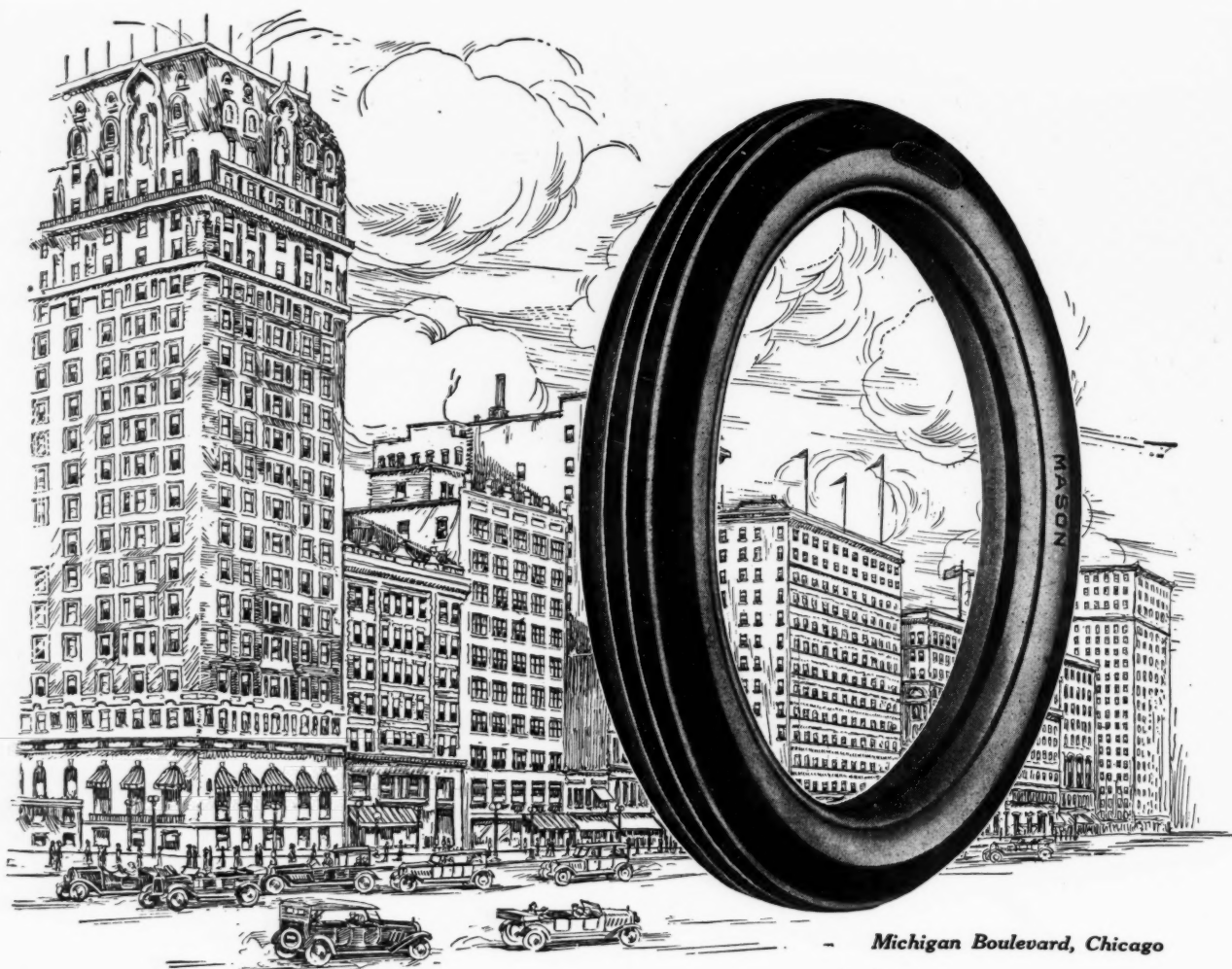
Mr. M. E. MASON
Mohawk Sales Manager



MOHAWK RUBBER CO.
AKRON, OHIO

New York
Atlanta
Chicago

Kansas City
Boston
San Francisco



Ideal for Every Day Road Service

Take reasonable care of your Mason Tires and you'll invariably get "more mileage" records. Even with constant travel over the roughest roads, Mason quality will show in the speedometer's records.

Mason Tires are built for long, sturdy service—and yet they are sold at a popular price. And if they are not abused, they'll quickly demonstrate their economy in mileage costs.

Mason dealers are reaping the harvest of repeat orders, gained from Mason success. The fair play Mason dealer policy works to their advantage. A line to the factory will acquaint you with it.

The
MASON TIRE & RUBBER CO.

FACTORY AND HOME OFFICE: KENT, OHIO (Akron Suburb)

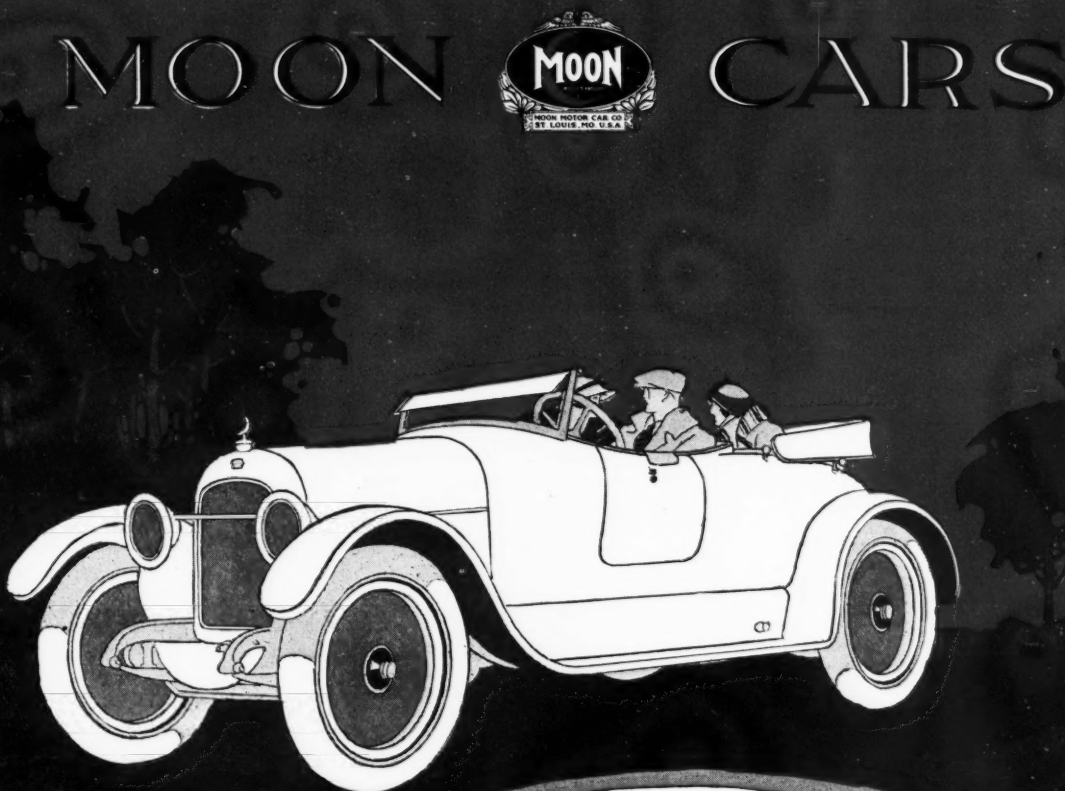
MASON

**MEANS
MORE MILEAGE**

Distributing Branches:

CLEVELAND	CHICAGO	NEW YORK	KANSAS CITY	BUFFALO	ATLANTA	AKRON, O.
1846 Euclid Ave.	2120 Michigan Blvd.	28 W. 63d Street	1732 Grand Ave.	834 Main Street	21 Houston Street	34 W. Market Street

When Writing to Advertisers, Please Mention Motor Age



Striking Looks—Performance—Price

These points stand out without being brought out by Moon dealers.

Country-wide recognition has come to the Moon car,—the all around quality Six of extra service.

Moon equipment for the comfort of its passengers and driver, cannot be duplicated in other cars selling at a popular-price.

Our Factory location in St. Louis, outside the congested freight district, assures prompt deliveries. Aggressive dealers are invited to write immediately for particulars.

Six-66

Seven Passenger Touring
and Club Roadster

\$2250

f.o.b. St. Louis

Six-36

Five Passenger Touring
Fully equipped

\$1395

f.o.b. St. Louis

Brief Specifications: Six-36. This aristocratic model has scored heavily because of its light weight, popular price and after-economy. 114-inch wheel base, Red Seal Continental Motor, Fedders Radiator, new high honey-comb type, Timken axle and bearings, Delco ignition, Electric lights with dimmer system operating from dash. Upholstered in genuine Tan Spanish Leather.

MOON MOTOR CAR COMPANY, St. Louis, U. S. A.



Your Opportunity to Handle
a HIGH-QUALITY 1½-Ton
Internal Gear Drive Truck

TRIANGLE TRUCKS

SPECIFICATIONS

Waukesha Motor, Eise-
mann Magneto, Stromberg
Carburetor, Fuller Trans-
mission, Universal Drive
Shaft, Celfor Internal Gear,
Rear Axle, Torbenson Front
Axle, Detroit Bronze-
Bushed Springs, Gemmer
Steering Gear.

Wheelbase, 144 inches —
Turning radius 23 ft. 6 in.—
Tread, 56 inches—Clearance,
front 9½ inches, rear 12¼
inches—Tires, front 34x3½,
rear 34x6.

—this is the right capacity for meeting the re-
quirements of the average business.

—this capacity is in the field of volume sales which
means volume profits for you.

—this high-quality in a truck of Triangle size,
low-price and low ton-mile cost is a forceful
sales point—unique in this truck's capacity
class.

We can make immediate deliveries. We can furnish you
with all the help necessary to become firmly established in
this fast developing line of business. Wire, or write for
prices, complete specifications and dealer's proposition.

TRIANGLE MOTOR TRUCK CO.

St. Johns, Michigan



When Writing to Advertisers, Please Mention Motor Age

What Kind of Used Car Does it Pay to Buy?

It pays to buy any car if you can afford to own and operate it. The answer to that question should be interesting both to the man who buys a used car and to the man who buys a new one — because the resale value is equally important in both cases.

There was a time when the purchase of a used car was seriously questioned by many good judges. There was a time when it was considered only a matter of getting rid of cars which dealers had to take in exchange.

But times have changed. The used car business today is a real business, a legitimate business, and it is handled by men who are as jealous of their reputation, are as careful to give good

value as those in any other line of human endeavor.

These men know that it is not simply the sale price of a used car that the buyer should consider, but the condition of the operating parts of that car, the reputation of the maker, the performance that cars of that make have given in the past, and the probability of the performance they will give the new buyer in the future.

And in the new car or the old car, the life and usefulness of the entire unit and the expense of operating it, all go back to the design and durability of the fundamental parts of the vehicle.

Four or five years ago the Walden Shaw Livery Company of Chicago operated a fleet of twenty taxicabs, and literally wore them out in the severest, most continuous service that a motor car can have. But under

those cars there were two units that could not be worn out, the Timken-Detroit Front and Rear axles; and those axles, after an average of over a hundred thousand miles of service, were built into a new set of cars for the company.

That represents a real practical resale value that any car owner can see. So if you are considering the purchase of a used car, don't forget the importance of axle sturdiness when you are looking at tires, listening to the motor, or examining the upholstery.

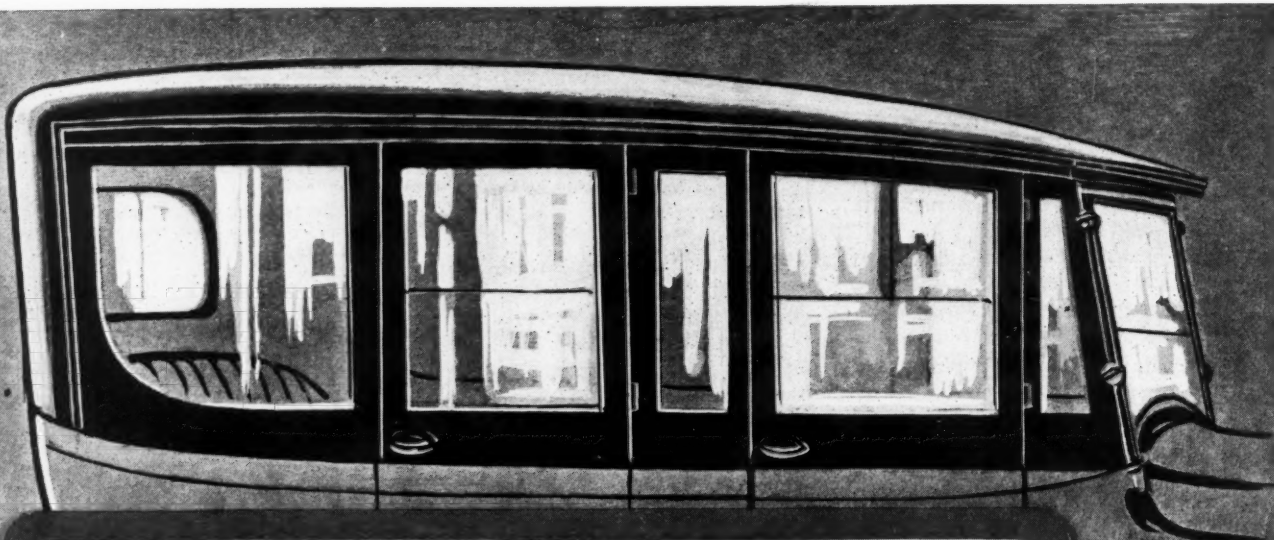
And conversely, when you buy a new car, remember that it is a fact proven out in many, many cases that the cars equipped with Timken-Detroit Axles have today the highest average resale value in proportion to their original cost.

THE
TIMKEN-DETROIT AXLE CO.
Detroit, Michigan
Oldest and largest builders of front and rear axles for both passenger cars and motor trucks.



TIMKEN-DETROIT AXLES

When Writing to Advertisers, Please Mention Motor Age



Here's a Top That Sells On Sight!

To Dealers

Whether you are facing a car shortage or not you want a practical way to expand your business and increase your sales. Anchor Tops offer the most advantageous proposition that the automobile equipment line has presented.

Anchor Tops have attained the popularity expected of them by their makers whose years of experience as Coach Builders is shown in the beauty and practicability of the Tops. The demand for Anchor Tops has increased 100 per cent this season—so far—over that of last year.

Every open car owner can be interested in them when their advantages are pointed out—their symmetrical lines, their elegance of appearance, their tasteful interiors, their capacity for installation without aid of expert help, and, above all, their all-year utility.

Anchor Tops offer *Opportunity*. They have proved immensely valuable as an additional line—their low cost and high desirability making them quick and satisfactory sellers.

But our output is limited by industrial conditions and dealers should write at once while shipping is still open.

To Car Owners

Anchor Tops solve for open car owners the problems presented by the approach of cold weather and the shortage of new cars.

With Anchor Tops, at small cost, you make your Buick, Oldsmobile, Overland, Dodge, Oakland or Ford a Closed Car—a luxurious Sedan or Coupe, glass enclosed with ventilating windows, upholstered in beautiful whipcord, adorned with a handsome dome-light. Nothing more attractive in motordom than the charming lines of Anchor Tops has been offered the public.

There is no squeaking, no rattling, no overhanging in Anchor Tops. They fit perfectly the regular body irons of your car and are adjusted without the aid of an expert.

Practically every open car owner, not now supplied, wants an Anchor Top. So you should be early with your order. Only a few can be taken care of and prompt action on your part will prevent delay and perhaps disappointment.

Anchor Top Sedan Coupe Glass-Enclosed

Use the coupon for photo-designs, prices and liberal discounts

The Anchor Top & Body Co., 734A South St., Cincinnati, Ohio

Fine Coach Builders for Thirty Years

(29)

The
Anchor Top
& Body Co.
734A South Street,
Cincinnati, Ohio

Send photo-designs,
prices and full details on
Anchor Tops.

Cars owned or handled.....

Name.....

Dealer ☐

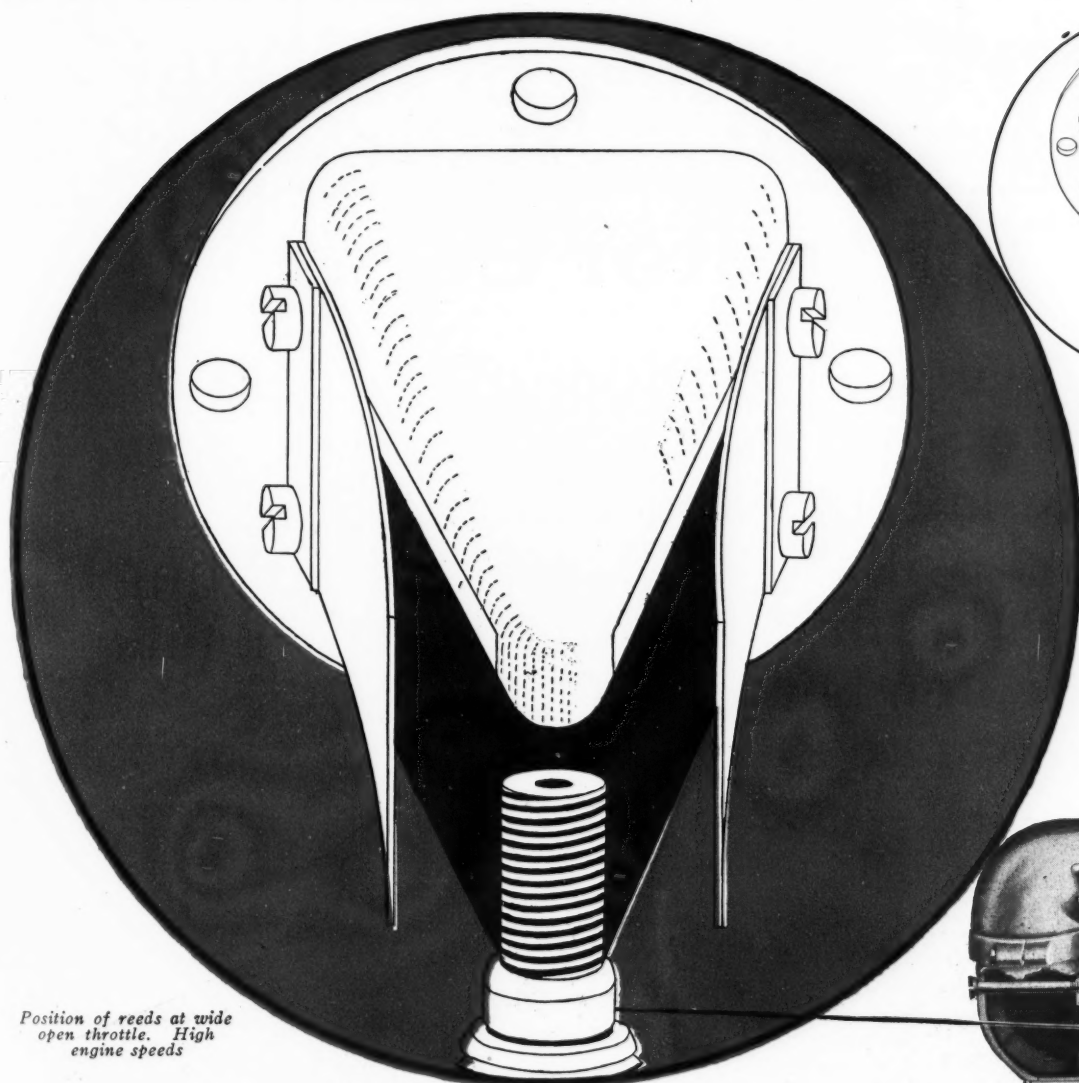
Owner ☐

Address.....

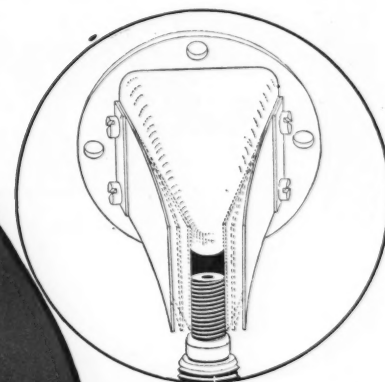


Tillotson

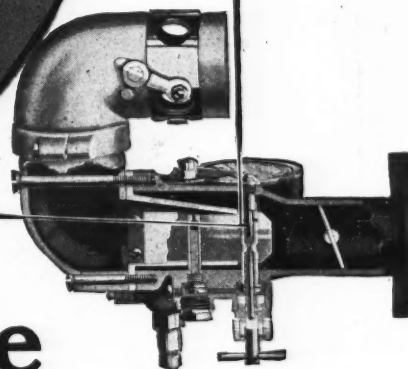
CARBURETOR



Position of reeds at wide open throttle. High engine speeds



Intermediate position of reeds changing with varying engine speeds



Automatic Air Valve

Naturally when a certain carburetor is known to be rendering unexcelled service on more than 350,000 cars, automotive engineers, car builders and dealers are more than usually interested.

They are anxious to make a study of its improved design and construction that makes possible its great success.

Many advantages contribute to the efficiency, simplicity and dependableness of the Tillotson carburetor.

One of its major features is its automatic air valve.

This advantage is recognized by

engineers as being the highest achievement in solving this feature of a carburetor.

There is but one adjustment—gasoline.

There are no working or sliding parts that cause friction or wear.

Let us figure on your requirements.

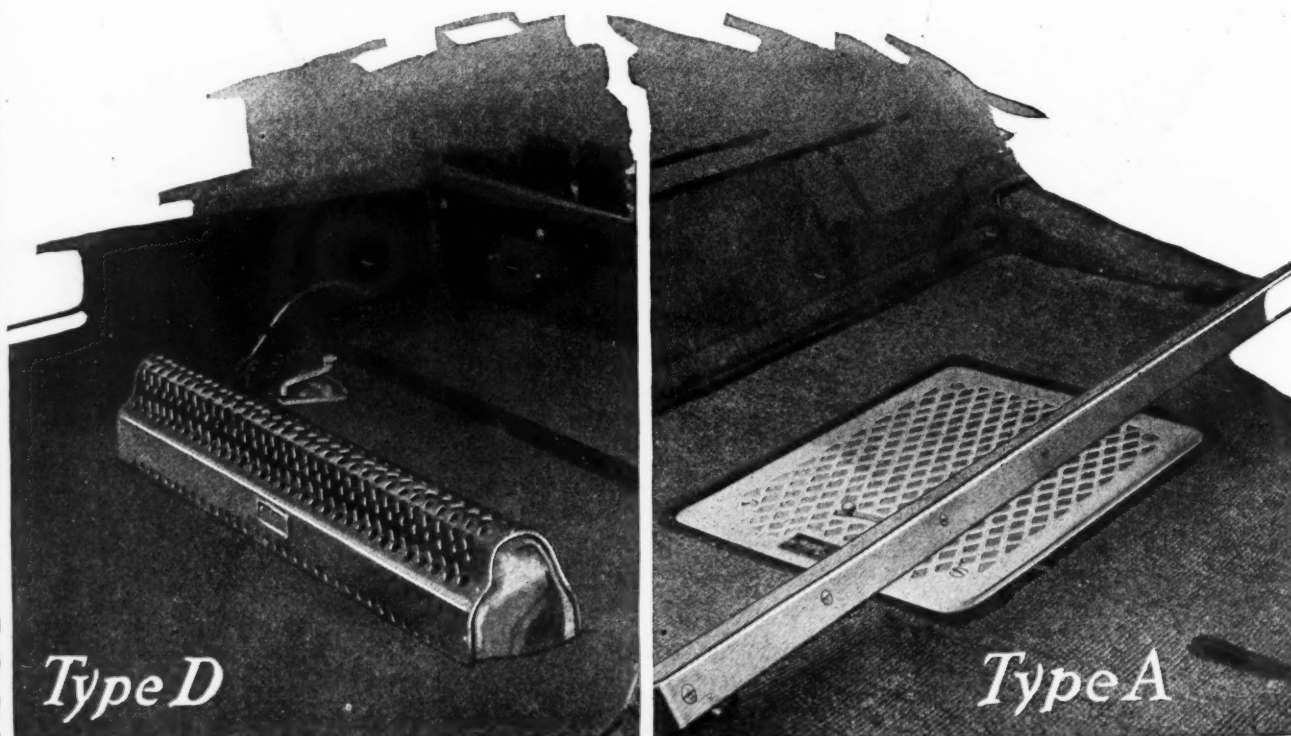
The Tillotson Manufacturing Company
Toledo, Ohio

When Writing to Advertisers, Please Mention Motor Age

STANDARD

300% Increase in sales of Perfection Heaters for Motor Cars

Garage installation of Perfection Heaters in existing cars was very large last fall and winter. This demand will be still greater starting with the first cool days and nights of September and October.



PARTS

for Motor Cars, Trucks,
Tractors, Motorcycles,
Airplanes and other Vehicles

Standard Parts Axles, Perfection Springs, Bock Bearings, Standweld Rims, Tubing, Tubular Parts

The Jobbing Trade will be looked to for supplies.

It is important that demands be anticipated for the further reason, too, that transportation difficulties, certain to come as winter approaches, may be avoided.

The merit of Perfection Motor Car Heaters is everywhere recognized.

Twenty-four motor car manufacturers now make them regular equipment on one or more models.

The Standard Parts Company

Executive Offices, Cleveland, Ohio

Factories: Cleveland, Toledo, Cincinnati, St. Louis, Canton,
Flint, Pontiac, Connersville and Wheeling



"We look upon Marathon Tires as our business representatives"

THAT sentence appears in every advertisement to users and prospective users of Marathon Hand-made Tires. Think a minute just what that means: put yourself in the place of the manufacturer.

We certainly must be sold on our own product, you say.

Yes we are. We make Marathon Tires so good that we are willing to stand up in paid magazine space and say to the customer:

"this tire represents our house; and we're willing to stand squarely back of it. We make it the best we know how to begin with and when it satisfies us at the factory then it is bound to satisfy you when you put it on your car."



Dealers like to do business on that basis. It's a good, safe and comfortable feeling to know that the manufacturer believes so firmly in his product.

Maybe there's a chance for you to represent us in your community. Better write, anyhow, and ask us.

The Marathon Tire & Rubber Company
Cuyahoga Falls, Ohio

Canadian Factory, St. Catharines, Ontario

MASTER TRUCKS

The greatest proof of the dependability of any truck lies in its ability to satisfy the heavy hauling demands of contractors, builders, coal dealers, and other business men who require a dump body.

Master Trucks are daily proving their dependability in this and every other field. The Special Master Hydraulic Hoist and Dump Body enables the driver to dump his load and be on the return trip in less than a minute.

For every other business too, there is a Master Body that meets every requirement.

Master of the Load on ANY Road

The success of this powerful truck has only been possible through the coordination of standard units, backed by fifteen years successful truck engineering and truck building experience.

Dealers of proven standard and ability are invited to write for liberal proposition.

2-ton "M," internal gear drive
2-ton "O," long wheel base, internal gear drive
2-ton "W," worm drive
3½-ton "A" worm drive
5-ton "B," worm drive
6-ton Tractor "T"

Master Trucks, Inc.

3137 S. Wabash Ave. Chicago, Ill.



When Writing to Advertisers, Please Mention Motor Age

You Can Plow Haul, Thresh or Churn with the Hession Tractor

Few tractors—and, for that matter, few motor cars or motor trucks—have evolved into a finished design through such a succession of painstaking steps as has the HESSION Farm and Road Tractor.

Eleven models, involving every principle known to engineering practice in the making of tractors, were designed, manufactured and tested before our engineers were ready to stamp the HESSION as worthy of the idea that inspired it.

Today the HESSION Tractor will do practically all the mechanical work on the farm—*better and more economically than it was ever done before*. It will do every kind of land work, every kind of road hauling (by means of interchangeable road wheels with solid rubber tires), and perform every office of a stationary engine.

It is light in weight, simple in design, easy of operation, and sparing of fuel. In its staunch assembly are found only the highest grade mechanical units: such as Hyatt and Timken bearings, Borg & Beck clutch, etc.



To the farmer who uses it, and the dealer who sells it, the HESSION Farm and Road Tractor is an unending source of profit—in perpetual economy and utility on the one hand, and increasing good will and business prosperity on the other. A HESSION dealership has exceptional possibilities—well worth asking about.

See the HESSION
at Salina, Kansas, Week of July 29

**HESSION Tiller and
Tractor Corporation**
27 Jewett Ave., Buffalo, N.Y.

The BOSCH Way to Unusual Business



It Brings in the Cash

CARS these days must run better and further for less outlay than ever before.

Every drop of gasoline must be used efficiently—there must be no missing with its racking of bearings and car; no half-fired mixture, and no wastage of gas and oil.

Your part, if you sell cars, is to have those cars equipped with efficiency-increasing

BOSCH AMERICA'S SUPREME IGNITION SYSTEM

If you repair cars or sell accessories, every car—new or old—that is not Bosch Equipt should be brought to the highest pitch of efficiency by fitting Bosch.

Special fittings, making it easy to install a Bosch Magneto, are carried in stock for most cars not Bosch Equipt.

This is the way to a definite line of business. Ask for prices.

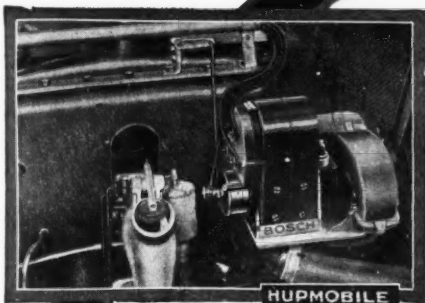
Write for illustrated booklet showing attachments fitted to engines.

BOSCH MAGNETO COMPANY

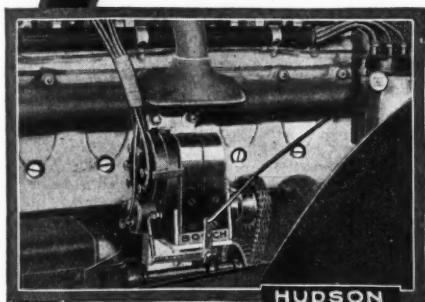
Main Office: 214 West 46th St., New York City. Branches: Chicago, Detroit, San Francisco
Works and Foundries: Springfield, Mass.

Attachments for

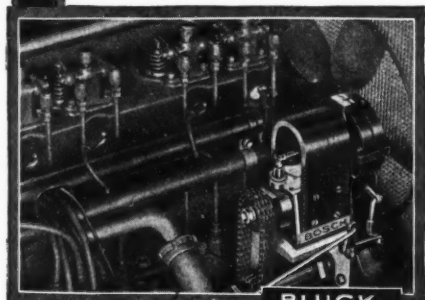
Fords
Dodge
Hupmobile
Hudson
Buick
Mitchell
Haynes
Chevrolet
Scripps-Booth
and other
prominent
makes



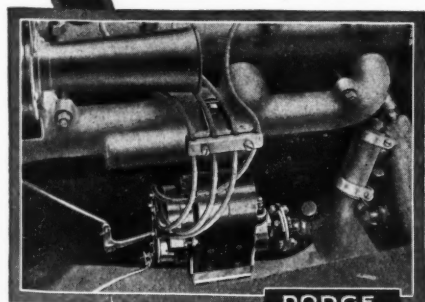
HUPMOBILE



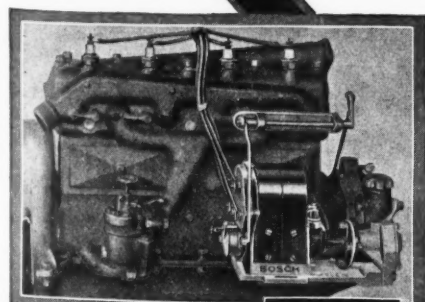
HUDSON



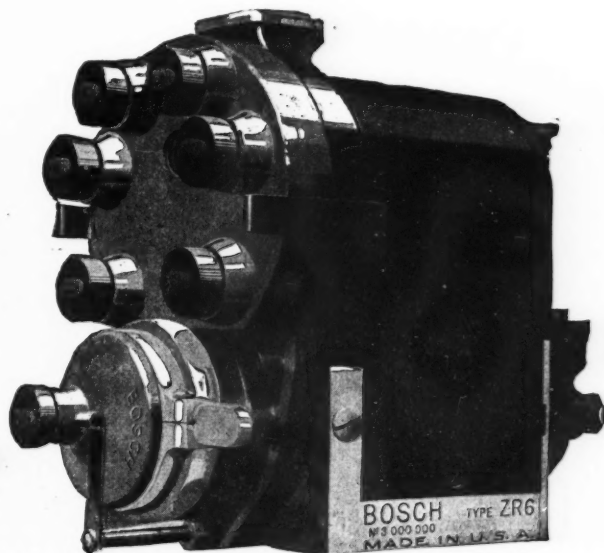
BUICK



DODGE

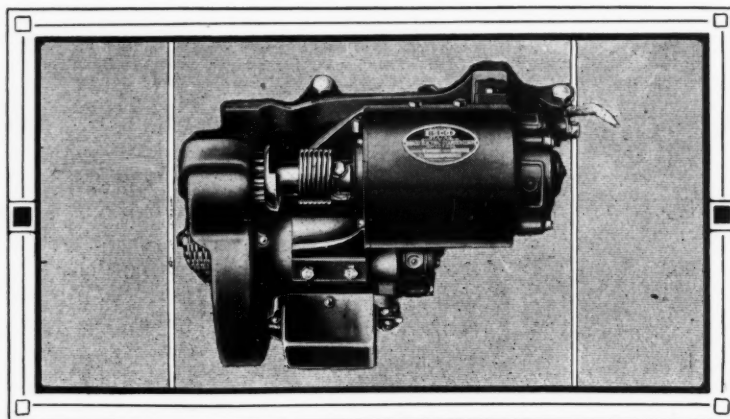


FORD

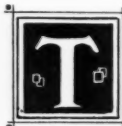


When Writing to Advertisers, Please Mention Motor Age

Disco
DEPENDABLE PRODUCTS



Backing



HE SAFEST WAY to choose a starting and lighting system for Ford cars is to pick the one with the strongest backing—personally, financially, and in manufacturing facilities.

Every electric system is more or less a mystery to the average man. No one but a mechanical expert is capable of judging the mechanical merits of the various systems offered. But if you choose one made by a strong, well-financed, well-organized concern—a company in business to stay and with a reputation to sustain—you can be certain that the system will be good, and that it will be taken care of properly while it is in service.

It is largely because of this fact that the most careful buyers and dealers are adopting the Disco system. For certainly no system has stronger backing than the Disco. The Disco is backed by the financial strength of Mr. Arthur Jordan of Indianapolis. Mr. Jordan owns the company outright. To anyone who will look up his rating, this will prove that the Disco Company will permanently remain a leader in the field.

The Disco System is made in a plant that has no equal in the industry for efficiency and modern equipment. Ninety-five per cent of the entire system is made in this plant, where each part can be watched, checked, and inspected for accuracy.

Back of the Disco Systems, stands the experience, ability, and reputation of the Disco organization. Max Hagelstine is the Production Manager—formerly Experimental Engineer and Service Manager for the Studebaker Corporation. Ask any Studebaker dealer if the fact that the Disco System is produced by Hagelstine isn't the strongest guarantee of quality any system could possibly have.

Dean Emerson, Manager, and S. E. Webster, Engineer and Designer, are both known throughout the industry for their good work for the Wagner Electric Company—Harry F. Prescott, Sales Manager, formerly with the Saxon Company—the most pre-eminent dealers throughout the country will vouch for his ability.

With backing such as this, you are safe in buying or handling Disco Systems.

Dealers—Send for proposition. It is liberal. It offers big opportunities for profit right now when some lines are off.



Wonderful Opportunities

in a few important territories for Distributors who are established and have an organization capable of handling our proposition to the dealers.

Write quick.



The J & D Guarantee Means More Than "Assurance of Mileage"

It is not possible to procure, anywhere or at any price, better materials than go into the construction of J and D Tires.

No way of putting these materials together can surpass the J and D method, evolved from twenty years of experience in pneumatic tire making.

No tire can give fuller assurance of uninterrupted service, up to and far beyond its guarantee of 5000 miles. This is

attested to by the remarkable record of only $\frac{1}{2}$ of 1% returned for adjustment, of all J and D Tires sold.

If you have a penchant for



economy, your choice will be —*must* be—J and D.

Dealers: There is still considerable J & D territory to be assigned. Yours may still be open. In any event, find out about this exclusive agency, for it may prove the beginning of a long and profitable relationship. Write for particulars today.

J & D Tire Company

Charlotte, N. C.

New York Office, 1834 Broadway



**Get more power
Save gasoline
Save oil
Stop plugs fouling
Stop engine smoking**

30 minutes' after you install

Within thirty minutes after you start your engine after installing Munger "Always Tight" Piston Rings, compression losses, with their attendant wastes, will be forever ended.

Engine troubles that seemed incurable will permanently disappear.

The secret of this super-efficiency is perfect and lasting FIT. Munger "Always Tight" Piston Rings FIT when you install them—and they continue to FIT.

By an ingenious method of peening these rings are made to conform to the shape of any cylinder, even though worn out-of-true. This peening also holds them to their original tension against the cylinder walls, and the wonderful "Always Tight" Expansion Joint compensates for wear as it occurs, preventing the slightest opening through which gas can escape.

Being made in one piece, these rings are not susceptible to the ailments of more complicated rings.

Put Munger "Always Tight" Piston Rings in your engine. Give them a fair trial. If they do not fulfill all our promises—if they do not do ALL you expect them to do—take them back to the dealer from whom you bought them, and he will return the full purchase price.

SPLITDORF ELECTRICAL CO., Newark, New Jersey

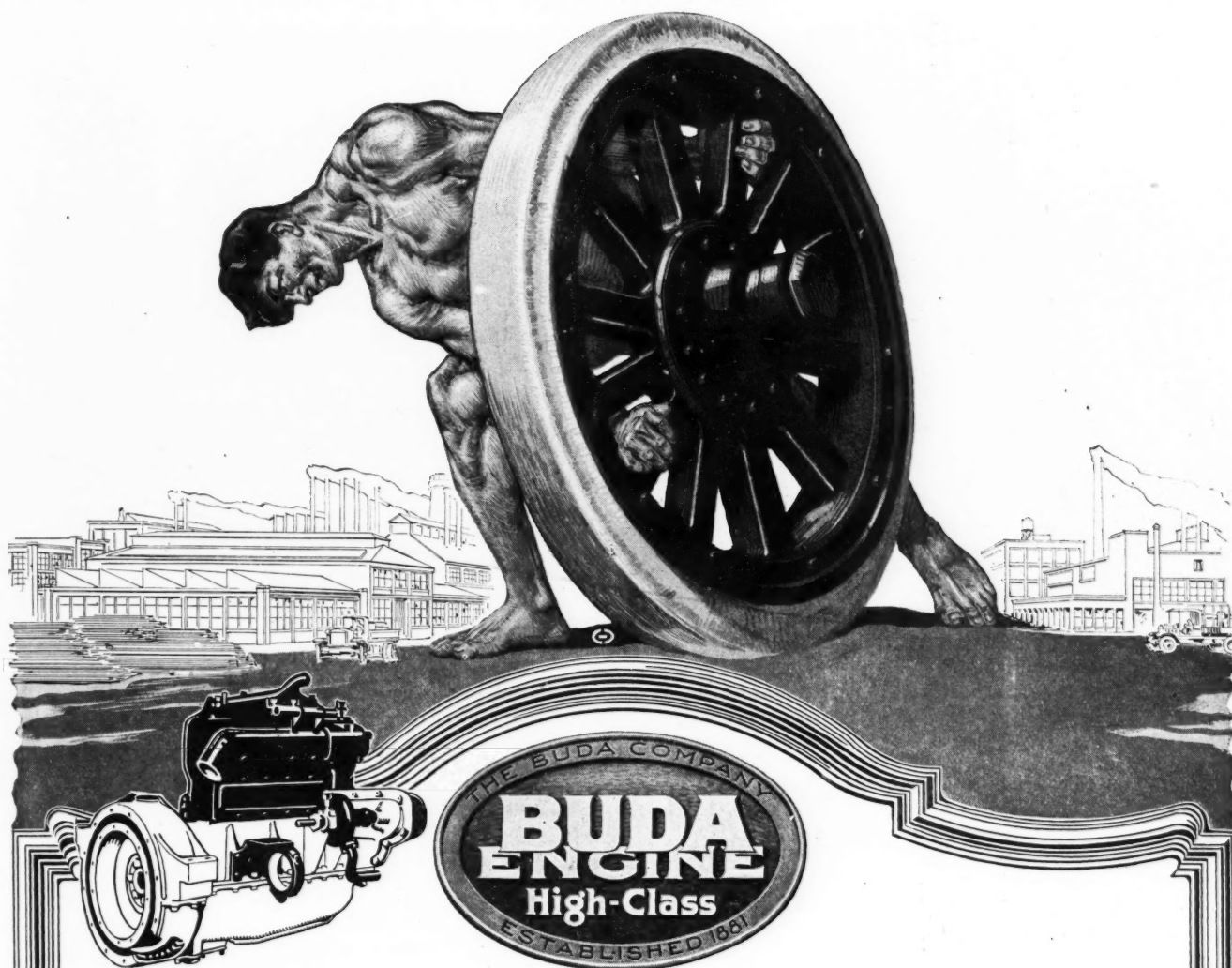
Splitdorf Branch Houses and Service Stations:

Atlanta	10-12 E. Harris Street	Newark	278 Halsey Street
Boston	68 Brookline Avenue	New York	7 W. 61st Street
Chicago	2613 S. Michigan Avenue	Philadelphia	210 N. 13th Street
Dallas	402 S. Ervay Street	Pittsburgh	5943 Ellsworth Avenue
Detroit	1295 Woodward Avenue	San Francisco	1022 Geary Street
Kansas City	1827 Grand Avenue	Seattle	1628 Broadway
Los Angeles	1215 S. Hope Street	Toronto	469 Yonge Street
Minneapolis	816 Hennepin Avenue		



MUNGER
"Always Tight"
Piston Rings

The MUNGER "Always Tight"
PISTON RING OUTFIT—
8 Regular Size Rings
4 Over-width Rings
1 Regrooving Tool
1 Ring Insertion Tool



Pulling Power or Horse Power?

Perhaps you've seen a *forty horsepower* truck, with wheels pocketed in a "saucer," which had to be pulled out by a plain *one horsepower* horse. It has happened.

The engine in *that* truck was not a BUDA—it may have had its forty horsepower *at high speed*, but it *lacked* what the BUDA has—ability to pull hard *at low speed*.

When an engine has that ability it has torque—the power to turn itself against resistance—to pull to the last turn—something very different from horsepower.

Torque ordinarily is very low at low engine speeds, but the torque of the mighty BUDA TRUCK ENGINE is almost as great at its lowest as at its best speed.

THE BUDA COMPANY HARVEY (Chicago Suburb), ILLINOIS

THE BUDA ENGINE

"HIGH CLASS"



Why I Recommend Sterling Spark Plugs

AS A DEALER I wanted to handle a spark plug I could recommend on my own personal knowledge.

I took hold of Sterlings knowing the well-established reputation of the manufacturer, the Lockwood-Ash Motor Co.

For nearly 20 years, as marine engine and spark plug makers this company has sustained a reputation for unquestioned business honor, always jealous of its good name.

As to the plug: I was as well satisfied with it—the close-grained porcelain core, the Monel metal electrode, the



Separable — Cleanable

sturdy construction, the leak-proof assembly.

And now that I have sold thousands I can recommend them without reservation.

As to separable construction—I assert that to yield the utmost in service a spark plug must admit of repeated separation and re-assembly.

In no other way can it be positively cleaned and made new.

These are the leading reasons why I sell Sterling Spark Plugs. There are other reasons, but these are most important—and sufficient.

LOCKWOOD-ASH MOTOR CO.

1956 Main Street

Jackson, Michigan



A size and style for every car

Sterling Spark Plugs

(44)

When Writing to Advertisers, Please Mention Motor Age

The Springs With the Extra Guarantee

When your customers come to you with broken springs—replace them with springs that you can stand back of—springs that you can depend upon to deliver perfect satisfaction.

TUTHILL
GUARANTEED
TITANIC
LUBRICATED
SPRINGS

are so strong, so well built, so perfectly constructed, that they are not only guaranteed at all points and in every respect for one year, but they are also guaranteed *forever* against center breakage—where three out of four old fashioned springs break.

That is why more spring replacements are made with Tuthill Titanics than with all other makes combined. And that is why Tuthill dealers are always successful dealers.

Send for Complete Book on Springs

70 pages of valuable information for every dealer make the new Tuthill Book the most complete book on springs ever published. You can instantly quote prices on springs for any car—no matter how old or what the make or model.

A Tuthill Distributor, very near you, is ready to give you the quickest kind of service. Complete list of distributors in Chilton's and Auto Trade Directories.

Tuthill Spring Co.

(Established 1880)

760 Polk Street Chicago, Illinois



See that
Arch

**Guaranteed
Forever Against
Center Breakage**

Turn Losses Into Profits

The motor car shortage is much less severely felt by dealers who hold the Lalley-Light franchise.

Those who have had it any length of time have already profited on the sales possibilities of Lalley-Light.

Curtailment of motor car supply simply means, to them, more time to concentrate more closely on Lalley-Light and keep net receipts up to the mark.

Desirable farming and small-town territory is yet to be had.

Write at once or wire for details.

Lalley Electro-Lighting Corporation
791 Bellevue Avenue Detroit, Michigan

LALLEY-LIGHT
ELECTRIC LIGHT AND POWER FOR EVERY FARM

KING "8"

The latest King—Model F—is more than a car—more than a machine—it is an achievement; the car you *knew* would come some day.

See it; ride in it; feel the swelling power that climbs the steepest hills, or throttles down its giant energy to worm a way through crowded traffic—and does it all in "high." That is **utmost flexibility**.

Dash over the open road—there's "express train" speed in the King for sport or emergency—or glide along, silently as a canoe on a quiet stream, resting your mind and nerves. Do it all with a marked saving in tire and "gas" expense. That is **true economy**.

Rest in the roomy luxury of the great seats,

and consider how such spaciousness and comfort is carried on a 120 inch wheel base—8 inches more turning play than most big cars. That is **efficient designing**.

And, when you've bought the car, back of you stands the pioneer organization that made it; originators of many features now considered essential in automobile construction, able and willing to help you for all the years that the car shall last. That is **real service**.

Prove these things for yourself by a demonstration and you will surely own a KING.

Foursome

Touring Car

Sedan

KING MOTOR CAR COMPANY, DETROIT



When Writing to Advertisers, Please Mention Motor Age

NORWALK

Why Jones Lost the Norwalk Agency

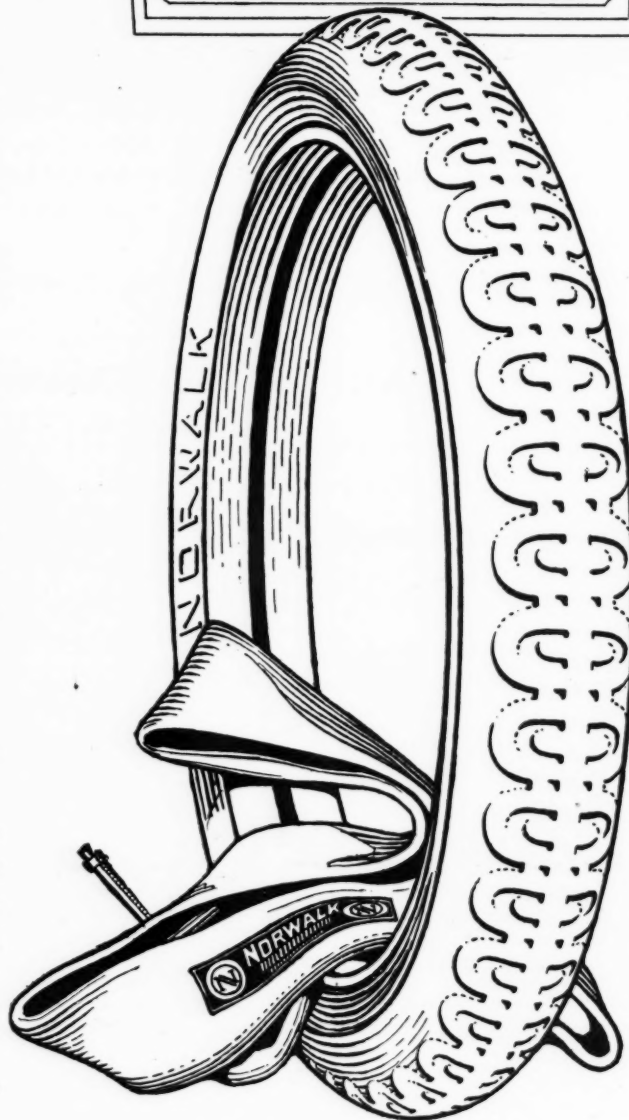
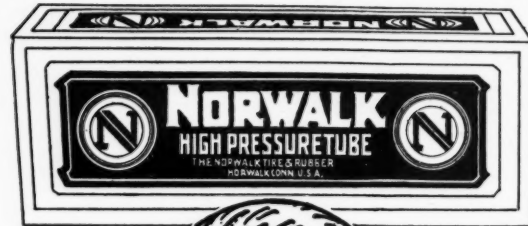
It wasn't his fault perhaps. He was fed up on claims. He didn't know *the men making Norwalks*. The record of these casings and tubes on the road had escaped him. He thought he'd "look into it later."

Jones sells good tubes and tires, but Smith has the edge and the luck.

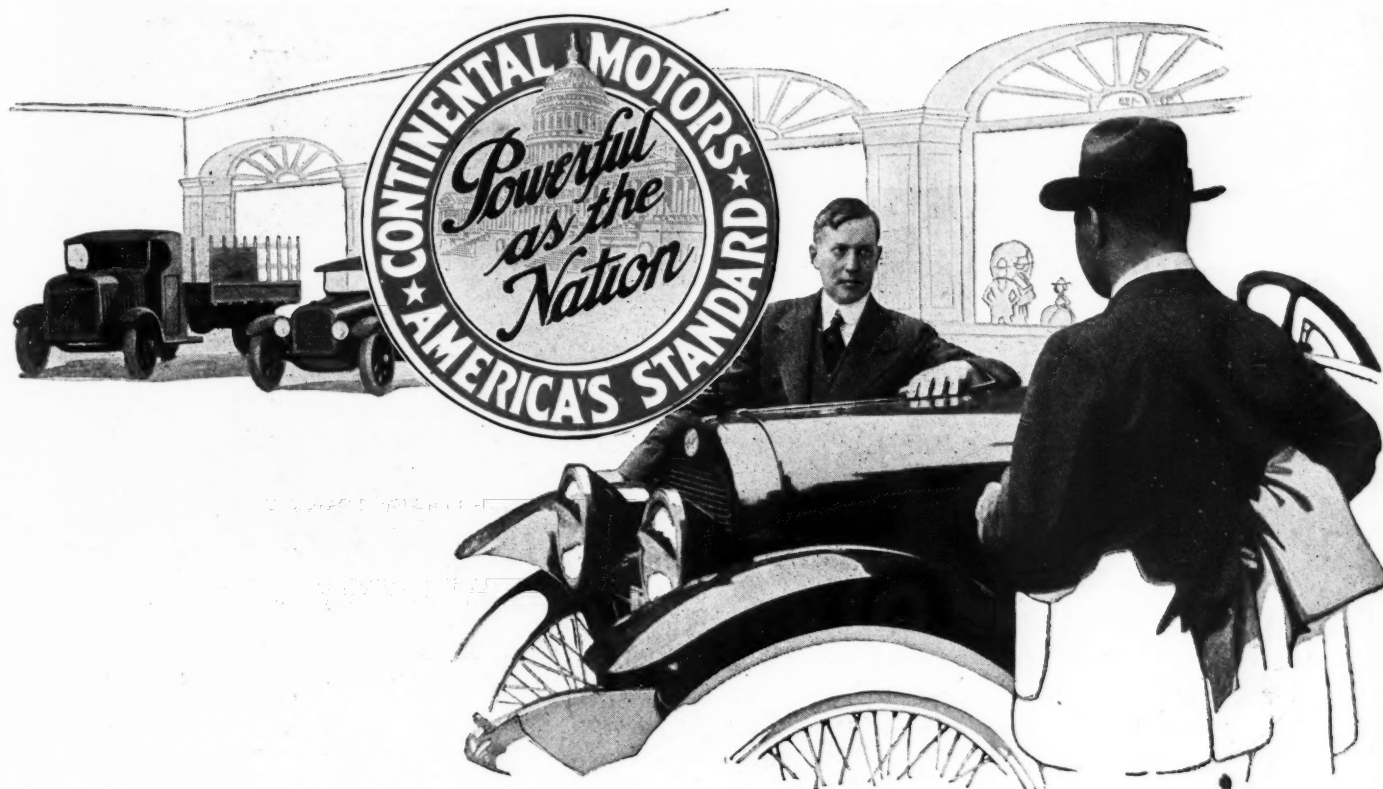
One of our men showed him the Norwalk. He compared it with what he had been selling. His customers compared it too, and some of Smith's customers were Jones's customers' friends, and they compared it, and Jones, with a good line, saw some of them go to Smith because Smith carried the Norwalk line.

If you don't believe it make the test yourself. Nobody likes to be Jones when it's just as easy, and twice as profitable, to be Smith.

NORWALK TIRE & RUBBER CO.
NORWALK, CONN.

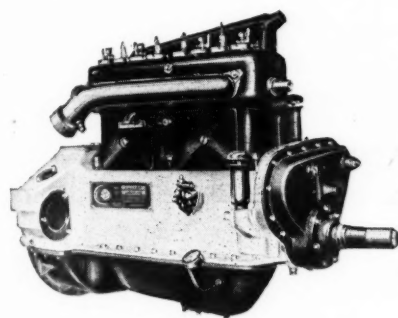
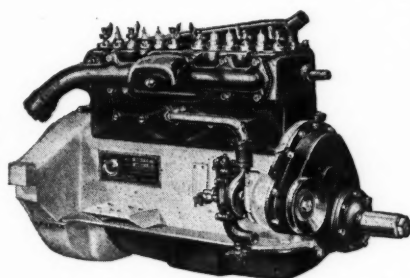


HIGH PRESSURE
CASINGS AND TUBES



"Has it a Red Seal Continental Motor?" The Important Question.

America's Standard
Passenger Car Motor.
Look for the Red
Seal
Nameplate.



America's Standard
Truck Motor. Look
for the Red Seal
Name-
plate.

When you buy an automobile or truck how can you be sure of the motor—sure of its power, its economy, its speed, its silence, its durability?

The most convincing evidence of what a motor *will do*, is the record of what it *has done*. Past performance is the surest evidence of motor worth.

When you buy a Continental Red Seal Motor you buy a motor proved by performance—a motor embodying nothing untried, nothing experimental.

—A motor conceived not over night, but the sure result of fifteen years of patient endeavor—by an organization which is today the largest exclusive motor manufacturing concern in the world.

—A motor not built around one man's idea, nor one school of motor thought, but a motor in which is refined all the best engineering knowledge of our generation.

—A motor proved not merely in one make of car, but in hundreds of thousands of automobiles and trucks of many makes, under every condition of service.

—A motor endorsed not alone by its makers, but by over 160 manufacturers who use it in the automobiles and trucks they make, and thus upon it stake an investment of millions of dollars. Look for the Red Seal on the motor in the car or truck you buy. It's your guarantee of motor quality.

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Detroit, Michigan

Factories:
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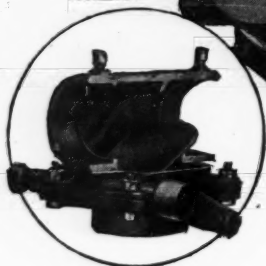
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Continental Motors

STANDARD POWER FOR AUTOMOBILES AND TRUCKS

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Sectional view
showing paten-
ted gas-tight
tongue - valve
open



*"Tells
the motor's
Secrets"*

Keep your engine fit— Nip trouble in the bud

Don't overlook the little engine troubles. They soon develop into big ones. Know what your engine is doing, and it's easy to keep it right.

Put a G-P Muffler Cut-Out on your car. It accentuates the purr of the engine and warns against power wastage. The G-P calls attention to operating defects that escape the unaided ear. It cuts cost by saving power.

The G-P Muffler Cut-Out is built simply and strong. Gases exhaust fully with no possibility of back-pressure.

It literally blows the carbon out of your engine. Carbon cannot accumulate. Made in two parts, permitting quick and thorough access to interior. Gives complete cooling relief to the motor. Put one on and know at any time what your engine is doing. It will save gas and increase power.

Sales Department

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Manufacturers:

The G. Piel Co., Inc., Long Island City, N. Y.

The G-P Muffler Cut-Out



DISTEEL WHEELS

The Wheels That Complete The Car

The Disteel Wheel—a spokeless steel disc—enhances the beauty of motor cars that are already beautiful. The plane surfaces of Disteel Wheels harmonize and complete the streamline treatment of the car's design.

In addition to this Greater Beauty, Disteel Wheels possess many mechanical superiorities. They increase vastly the security, comfort and economy of motoring and eliminate many of the wheel-worries of the road.

With no increase in weight, Disteel Wheels are more resilient and much stronger. They add greatly to the safety factor of the wheels which must bear the strain in skidding or collision.

The Disteel Wheel is easily and quickly demounted

and the spare wheel substituted. Moreover, it stays tight with the hub and cannot work loose. The tires, too, are easily changed. Disteel Wheels cannot wobble and there are no spokes and rims to squeak.

Disteel Wheels are easily cleaned. They save tires and add tire-mileage.

We believe that the Disteel Wheel marks in motor car engineering and in elegant motoring an advance as epoch-making as the introduction of the electrical starter.

If your car is a beautiful car—and Disteel Wheels are designed only for such cars—the dealer who sold you the car can give you all Disteel Wheel information:

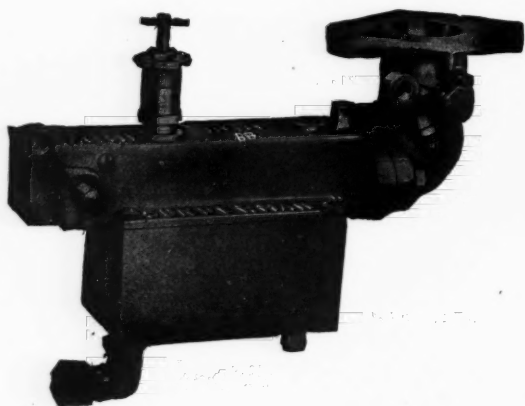
**DISTEEL
WHEELS**

THE DETROIT PRESSED STEEL COMPANY, DETROIT, U. S. A.

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SUNDERMAN

Vacuum Carburetor



MODEL BB

\$8 WITHOUT CONNECTION
\$10 with regular connection
\$12 with special connection

Model F—Special for Ford, **\$6**
Metz and Saxon Four - -

F. O. B. Newburgh

Are You GUESSING at Your Mileage? Find Out Definitely What You Are Getting

THE next time you fill your gasoline tank, take note of your speedometer reading. Put in 5 or 10 gallons, and when you need more gasoline take another speedometer reading to find out exactly how many miles you got from that 5 or 10 gallons of gasoline.

The Result Will Surprise You

When you actually see for yourself what you are getting, you will be surprised how much less it is than the mileage you believed you were getting.

This is a certainty, no matter what your car. Men who are calmly certain that they are getting 15 miles to the gallon discover they are actually getting 10 or 12 at most.

Here's the Remedy

If you believe you should get 15 miles from your car, equip it with a Sunderman Carburetor, and get 20 to 22.

The Sunderman Carburetor increases the mileage of any motor

from 30 to 50%—and it hasn't made any difference whether the car was new and lively or old and decrepit. It is true of cars all the way from a Ford to the heaviest car on the road.

The Sunderman Principle Is Universally Successful

Many cars get mileage increases much greater than 50% when equipped with a Sunderman. We have many letters to prove this. You can prove it yourself by your own car.

The reason is the Sunderman mixing principle. By multiple jets, operating with the automatic creation of a higher vacuum, the gasoline is torn apart into the most minute particles, producing an infinitely fine vapor that gives more power—more *drive*—from a smaller amount of gasoline. That's the Sunderman principle simply stated.

It Gives Much Greater Power, Too

When you need power—in bad or sandy roads, on steep hills, etc.,

the Sunderman Carburetor responds for you as surely and resistlessly as the tank of modern warfare.

This extra power is a by-product of fine vaporization. As a natural consequence there is a much greater flexibility, a quicker pick-up, a faster getaway, less gearshifting, *less carbon* because of more complete combustion.

We Want You to Prove This for Yourself

Write in at once if you're a car owner—it's like money in the bank waiting for you. Let the Sunderman Carburetor begin to *earn for you* immediately.

If You're a Dealer, Listen

The music of the cash register will be more regular, sweeter and greater in volume if you are a Sunderman distributor. Be a live enterpriser—prove it by writing us now for our proposition.

We take care of all orders immediately upon receipt. Write NOW

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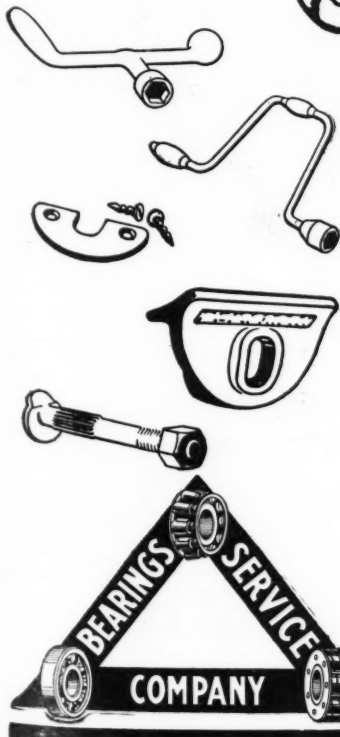
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For all cars equipped with Detroit, Baker, Perlman and similar types of rims.

Complete stock of all sizes of these types together with all rim parts kept on hand at all times.

The same grade of service on Rims that we have been giving on bearings—nation-wide in scope.

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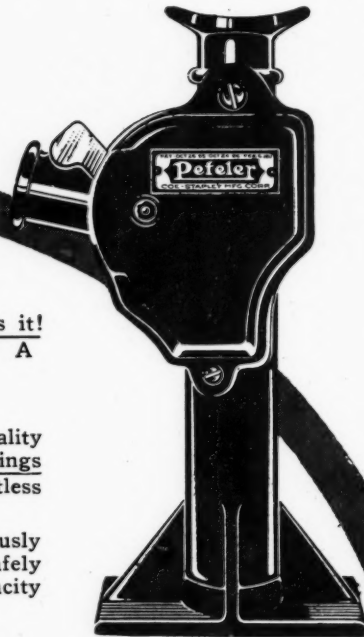
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The Jack that Sells on Sight



THE "Best Jack in the World"—and looks it! Distinctively built, handsomely finished. A fine, showy accessory.

Once you demonstrate it the sale is made.

Listen! The Peteler is not only made of quality materials through and through, but it will do things that no other jack will do—and in a safe, effortless fashion that makes a big hit with the motorist.

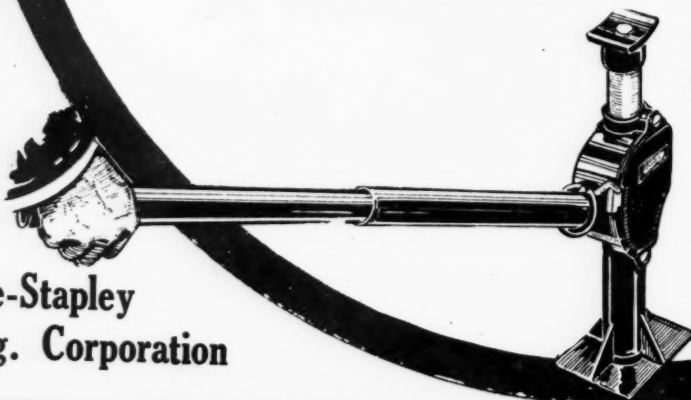
This jack is simple, compact and tremendously strong. It has no danger point—can be raised safely to the limits of the lifting bar. Has a tested capacity of 3000 lbs—half a ton more than necessary.

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*for the
best Jack
in the
World*

Peteler AUTO JACK

Its telescopic handle obviates crawling under car. Its short stroke allows operation without interference with car's overhang. It raises faster ($\frac{3}{8}$ " to the stroke) than other jacks. It is reversed by simple turn of handle, load coming down step by step—just as it went up. Then—when the load is all off—a slight lift of the handle allows lifting bar to drop its full length.



*Good profits for Dealers.
Ask your Jobber or write
direct for full particulars.*

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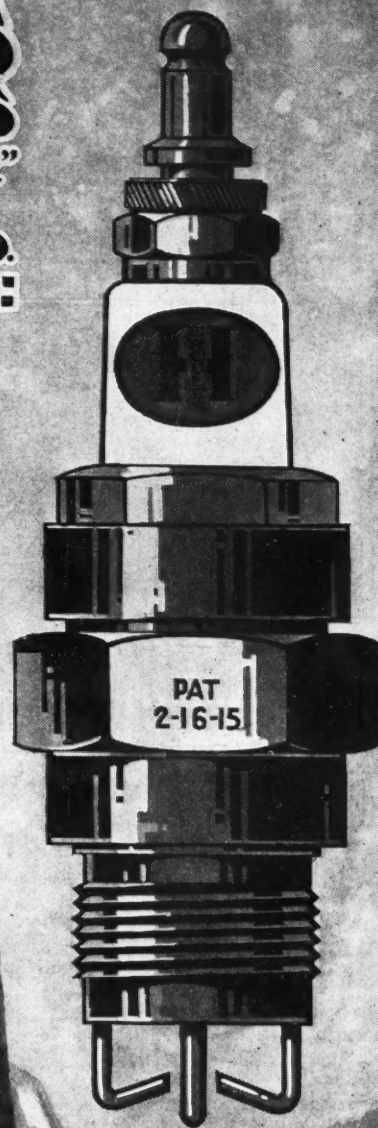
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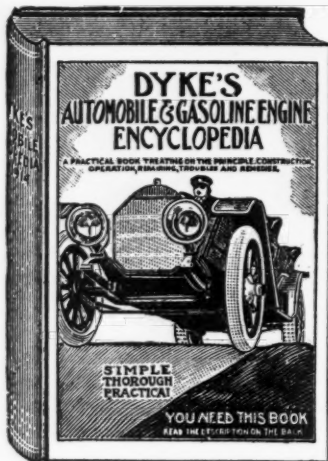
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DYKE'S AUTOMOBILE AND GASOLINE ENGINE ENCYCLOPEDIA

A Standard Work on Automobile, Truck, Tractor and Aviation Engines

Seventh Edition Revised 1918



If you wish to learn automobile construction, principles of ignition, carburetion and all electric systems, including repairing and adjusting—in a systematic, progressive manner—then this is the book you should have.

It is a text and reference book on everything pertaining to motoring. Simple as the A B C's. It's worth its cost if only placed on the shelf and used as reference.

The U. S. Government took all of the Sixth Edition issued in revised and enlarged form in January, 1918, and the Seventh has just been published. This contains a lot of new material on airplanes and trucks.

There isn't a trouble, repair or adjustment that cannot be found in this authoritative work.

If you don't find it's worth twice the price—you can return it. Order today—NOW—and see for yourself just what a valuable book it really is.

SOME OF THE SUBJECTS TREATED

in the Seventh Edition, 1918, of Dyke's Auto Encyclopedia.

ASSEMBLY OF A CAR: How the car is assembled from the ground up; Steering, Springs and Brakes—how to adjust all leading makes; Axles, construction of different types and how to remove parts and adjust; Clutches, all leading types as cone, disk, etc., fully explained; The Borg and Beck and others, as the Cadillac, Reo, Buick and all leading clutches are explained and how to adjust; Transmissions are covered equally as well as the clutches.

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TROUBLES AND REMEDIES: How to locate troubles by process of elimination.

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1189 Illustrations—154 Pages.

THE AUTOMOBILE REPAIRMAN: This is a very lengthy subject and is divided into several parts. The first part deals with the equipment necessary for doing light repairing, and explaining how one can enter the automobile repair business with limited capital. Also features the qualifications necessary of one starting into the business.

GARAGE AND REPAIR SHOP EQUIPMENT: how to build several sizes of garages and shops; how to light and heat it; how to adopt an office system; how to equip the garage with fixtures, as oil tanks, washers, etc.; how to equip the shop with tools and machinery; how to divide the business into departments and how to add money making additions, as tire repairing, auto accessories, electric department, welding, etc. Applies to small as well as large garages.

REPAIRING AND ADJUSTING ENGINES: first the cleaning and greasing of a car is treated, then the engine is overhauled; cleaning carbon mechanically, chemically, and with oxy-acetylene method; grinding valves, testing compression; testing for knocks; adjusting bearings; fitting rings; fitting pistons; reboring cylinders and fitting oversize pistons and valves, etc.

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Principle of construction and adjustment of universal joints, rear wheels, etc., fully treated.

ADJUSTING FRONT WHEELS, BRAKES AND STEERING DEVICES: explaining leading makes; relining, overhauling, cleaning and adjusting brakes; how to "toe-in," "camber" or align wheels and the importance of same.

HOW TO USE TOOLS AND MAKE REPAIRS: how to read measuring instruments, as micrometers, calipers, etc.; how to tell the different kinds of bolts and screws and threads; how to use taps and dies and cut threads; how to use drills and how they are numbered and lettered; how to read a drill gauge; how to solder, braze, case-harden; how to bend tubing, draw file, use chisels, etc. S. A. E. and U. S. S. threads explained; how to repair radiators; how to make gaskets; how to adjust silent chains, etc.

OXY-ACETYLENE WELDING and cutting with 60 illustrations.

USEFUL SHOP HINTS—illustrating many labor saving short cuts for the automobile repairman and miscellaneous shop hints, such as, how to straighten fenders, lamps, metal bodies, frames, etc.; how to make useful devices for the shop, etc.

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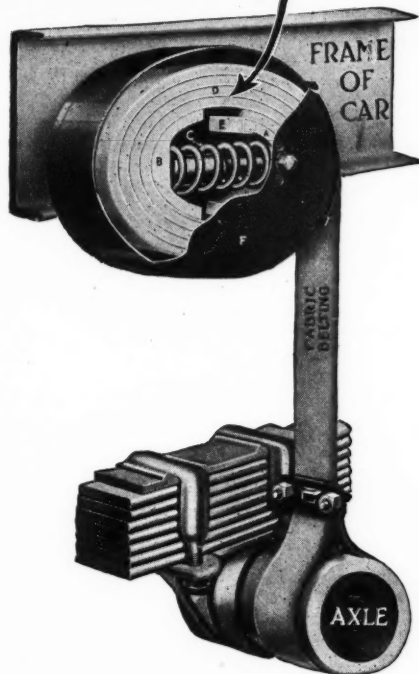
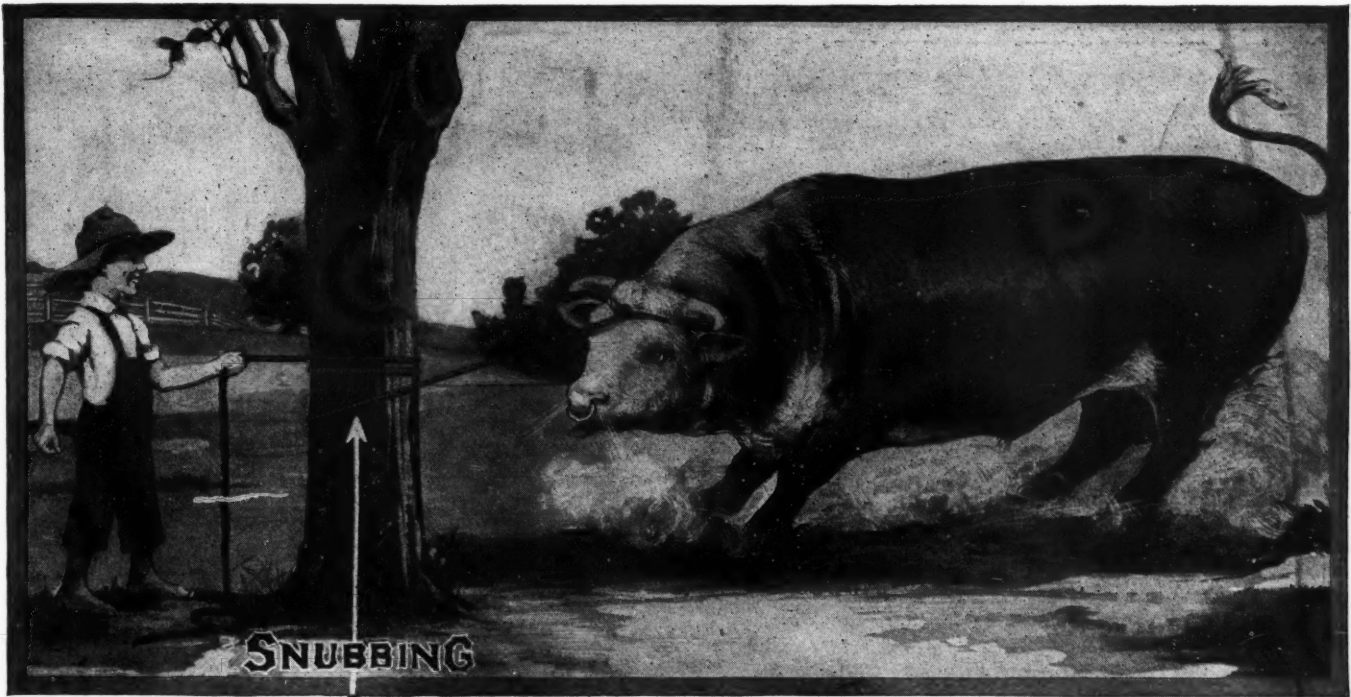
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By keeping the wheels from excessive bouncing up and down over the rough places, snubbers take the strain off tires and prevent spring breakage. These two savings alone repay their cost.

When you consider also the easy-riding qualities, the reduction in mechanical upkeep and the year or two of service they afford your car, you can readily understand why Gabriel Snubbers are

STANDARD EQUIPMENT on the LEADING CARS

Send for literature and name of nearest Dealer

THE harder the Bull pulls, the tighter the rope coils around the tree to hold him. The harder the Springs try to rebound, and throw you from the seat, the tighter the layers of the Snubber coil to prevent it.

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GABRIEL SNUBBERS

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Engine: High grade, vertical, 4-cycle, valve-in-head, counterbalanced crank, internal fly wheel.

Carburetor: Burns kerosene, gasoline or alcohol. Adjustable handle for easy starting and for different fuels. Fuel tank holds one gallon and is connected to carburetor with copper pipe.

Ignition: Special 32 volt type, distributor and coil.

Lubrication: Improved splash system of patented design. Oil gauge on crank case indicates oil level.

Cooling System: Cellular radiator, bolted to cylinder of engine; special adjustment to suit weather conditions.

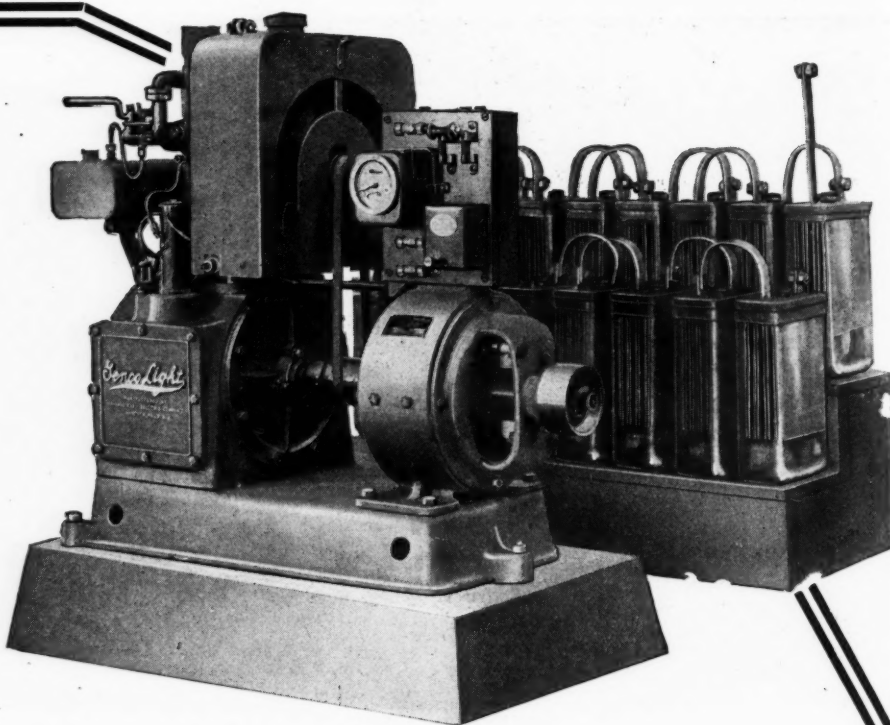
Generator: Our own design, specially constructed in our own factory. Gives high efficiency under rated load. Armature shaft supported by annular ball bearings.

Control Board: Bolted integral with generator; equipped with ampere hour meter—Bi-pole switch connects battery to plant. 2, 30 ampere fuses on house circuit, 5 amp. fuses on ignition circuit. All wiring at the rear completely enclosed and protected.

Starting Switch: Outfit is started by pressing button on control board. Special cutout stops engine automatically when battery is fully charged.

Battery: Our own special make, 16 sealed top glass jars—plates extra thick, insuring long life. Cells shipped fully charged.

Mechanical Power: Engine provided with pulley for driving machinery on line shaft direct. Engine delivers 2 H. P. for such work.



The Lighting Plant That Fits Farm Needs

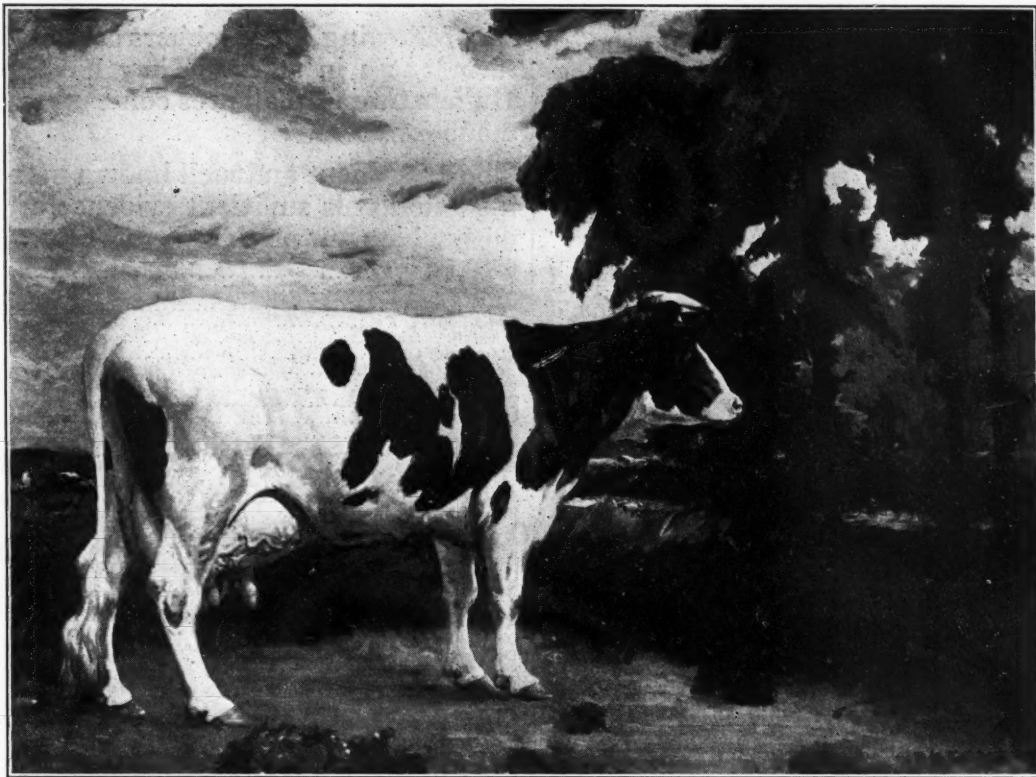
THE Genco Light outfit lights the house, barn and yard. It furnishes electrical power for doing useful work. It also supplies **mechanical** power, a feature not found in any existing Lighting Plants.

When the Genco Light does all this for the farm home, is it any wonder this outfit is meeting with such wonderful success in dealer sales?

Since increasing our facilities we are able to take care of more dealers in certain territories. You could sell farmers an outfit that has all the advantages possessed by the Genco Light—then write us about it today.

General Gas Electric Company
Seventh and York Streets Hanover, Pennsylvania

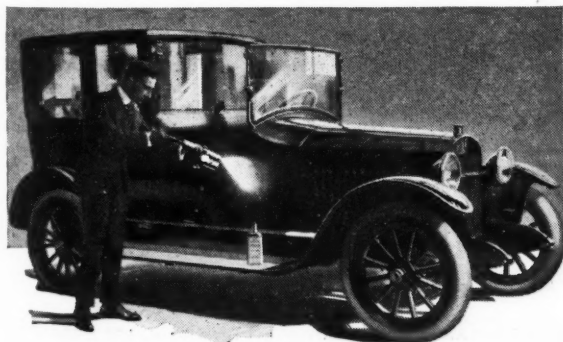
Segis Fayne Johanna, the *LIQUID VENEER* Cow



What Has This \$150,000.00 Cow to Do With
AUTO

LIQUID VENEER

Both are owned by the same man. The great success and popularity of LIQUID VENEER made it possible for the President of the Liquid Veneer concern to acquire the greatest herd of Holsteins in the world, including this world champion Liquid Veneer Cow, valued at \$150,000.



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To illustrate the greatness of this cow, remember she has produced as high as $7\frac{3}{4}$ lbs. of butter and 52 quarts of milk in a single day. *More than 10 times the production of the average cow.* Think of it!

To prove the value of Auto Liquid Veneer, don't forget that it is used by thousands of motorists for cleaning and polishing their cars, making it possible to almost entirely discard sloppy, harmful washing. Just spray it on over dust and mud. Then wipe off with cheese cloth. A clean, bright car, *just like new*, in 20 minutes' time at an average cost of 5 cents!

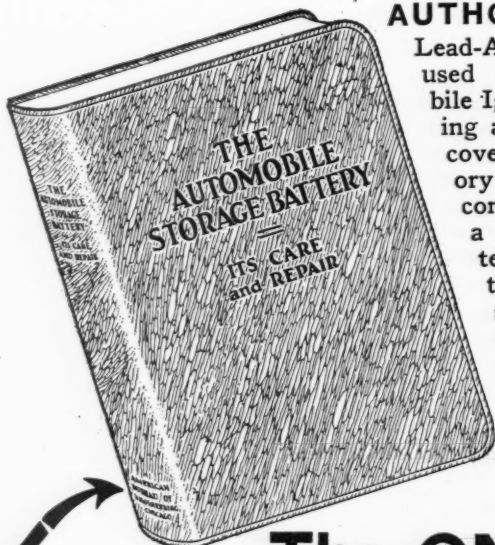
Truly, Segis Fayne Johanna and Auto Liquid Veneer are

Both World Champions

Try Auto Liquid Veneer today. Complete outfit, including sprayer and quart bottle of Liquid Veneer, \$1.50. *Saves expensive refinishing.*

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The ONLY BOOK that deals extensively of all repairs that can be practically made, written by an experienced engineer with the aid of many expert repairers.

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Special Instructions for different types of batteries in general use.

The book contains 280 pages, with 186 illustrations, graphs and charts, the section devoted to Rebuilding has 131 cuts, many from special photographs, detailing repair methods.

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You may send me at once one copy of The Automobile Storage Battery, for which you will find enclosed: Check ☐ Money Order ☐ Draft ☐ for Five (\$5.00) Dollars. It is understood that if the book is not entirely satisfactory to me, I may return it within five days at your expense and you will refund my money. I am the judge as to satisfaction.

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MORE POWER—MORE SPEED—MORE ECONOMY

are based on a scientific engineering principle. When attached to a Ford engine they produce a perfectly balanced crankshaft which in turn means an enormous reduction in vibration. Reduce vibration and you automatically increase power and speed. By using a special wrench included free with each set, the time of installation is cut down to less than an hour.



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COMPLETE
ONLY

\$12

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An Oil that really saves the Engine



Sold in barrels, half barrels, also 5-gallon sealed cans. Order direct from your dealer. Booklet sent on request.

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Motorists visiting Pennsylvania have taken Crew-Levick "Perfection" with them to use enroute and have found it so much better than ordinary oil that they have ordered thousands of barrels by mail.

Crew-Levick Perfection Motor Oil now is being made available to all who appreciate

the need for a better oil, with its economy and wear resisting features.

Crew-Levick Perfection is a good oil for conscientious dealers to handle. It is refined from pure Pennsylvania crude, declared by automotive engineers to be the best base for motor oil. It costs only a few cents more than ordinary oil, but it saves dollars of wear and hours of trouble.

We will be glad to correspond with all dealers wishing to handle a good oil, an oil that measures up to the needs of today. Your inquiries will receive careful attention.

Sold in barrels, half barrels, also 5 gallon sealed cans. Order direct or from your dealer. Booklet sent on request.

CREW-LEVICK COMPANY

117 N. Broad St.

Philadelphia, Pa.

Subsidiary Cities Service Co.

BRANCHES: New York, Chicago, San Francisco, Baltimore, Boston

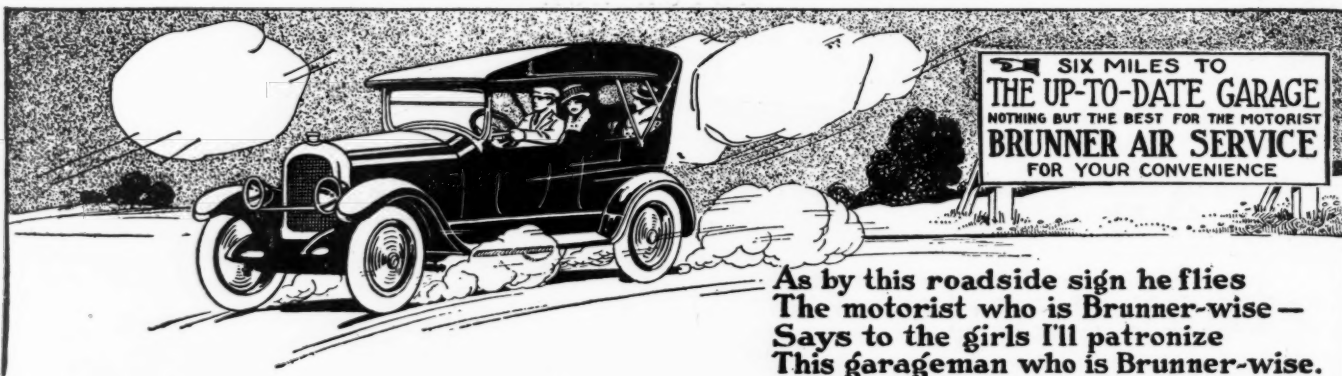
One of the oldest and largest producers and refiners of oil and manufacturers of petroleum

ESTABLISHED IN 1862

CREW LEVICK

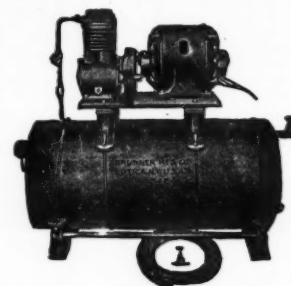
"as old as the industry"

When Writing to Advertisers, Please Mention Motor Age



THE CONFIDENCE OF THE MOTORING PUBLIC IS THE GARAGEMAN'S GREATEST ASSET

The average motorist knows that Brunner Service always satisfies, and these Brunnerwise Motorists have confidence in the garageman who renders Brunner Service, the Brunner Signs along the highways mark for him the spots where good service is available.



THE BRUNNER AIR COMPRESSOR

is strictly a quality product which has always been sold on its merit without resort to advertising promises of impossible performances.

May we send you our No. 15 Catalogue and name of the Brunner Jobber who covers your territory.

BRUNNER MANUFACTURING COMPANY
General Office and Plant: Utica, N. Y. Cincinnati Branch: Cincinnati, Ohio

WE WOULD LIKE TO TALK BUSINESS with DEALERS

Our proposition is one that appeals to every motorist. It is a rapid-fire, easy selling proposition that will help build up a substantial business for any dealer.

Shield's Injector is a grease gun that has been brought to the highest point of efficiency. It is a perfected grease gun that overcomes every disadvantage that has heretofore been thought of in connection with grease guns.

We supply cartridges of any standard make grease. The car owner simply slips in a cartridge and the gun is ready for work. The operator never touches the grease. A turn of the handle puts the grease exactly in the right spot.

No greasy hands—no ruined clothing—no wasted grease—no time lost. The gun can be carried in the car where it is always handy.



Just slip in a cartridge of grease and the gun is ready for work

SHIELD'S INJECTOR A PERFECT GREASE GUN

Strong and durable in construction—nothing to break or get out of order. Absolutely the most efficient and satisfactory grease gun that has ever been placed on the market.

Made of steel, finished in black baked enamel with nickel plated ends and handle. Will last a lifetime.

DEALERS! This is an opportunity that you cannot afford to overlook. We are receiving orders daily from all over the country.

WRITE FOR DETAILS

WHELESS-WILSON AUTO SUPPLY CO.
SHREVEPORT LOUISIANA



The old way that means greasy hands and soiled clothing



The new Shields way that means convenience, comfort and saving of time

When Writing to Advertisers, Please Mention Motor Age



FRANK MILLER'S MOHAIR TOP DRESSING

**Gives the Top that Smart Trim Appearance
It Had When New**



PRICES:

(East of the Mississippi)
Pint \$0.95
Quart 1.50
Gallon 4.50

*A quart is enough for
Top and side curtains, if
properly applied. Easy to
use — with sponge or
brush.*

IT IS SPECIALLY MADE WITH
A VIEW TO giving a beautiful,
lasting, silky sheen, *without the
slightest harm to the rubber insert
that makes a Mohair Top water-
proof!*

IT HAS AN 80-YEAR-OLD REPU-
TATION BEHIND IT. The
Frank Miller Co. has been manufac-
turing Quality Products since 1838,
and during all that time has enjoyed
a reputation for making dressings
that "fit the case," dressings that
are the result of study and experi-
mentation with regard to the special
purpose for which they are to be
used.

MOTORISTS SHOULD KNOW
THAT A MOHAIR TOP IS CON-

STRUCTED with a thin layer or
insert of rubber between two thick-
nesses of cloth. This rubber insert
makes the Top waterproof. Alcohol,
Benzine, Gasoline, Turpentine, and
other similar ingredients contained
in ordinary dressings, will take the
elasticity out of this rubber insert
and then when the top is folded the
insert cracks, holes gradually ap-
pear in it, and the Top begins to
leak.

FRANK MILLER'S DRESSING
MAKES THE TOP LOOK LIKE
NEW—preserving the handsome
natural grain finish and bringing
out the rich, smart-looking appear-
ance that the top presents when
first made.

IT IS NOT INTENDED AS A

WATER-PROOFING. A careful
study of attempts to mend a rubber
insert once it cracks and leaks, has
convinced us that they are worse
than useless, as they spoil the
natural finish of the cloth and their
good effects seldom survive one fold-
ing of the top.

WRITE US DIRECT IF YOUR
DEALER HASN'T THIS DRESS-
ING ON HAND, and we will see
that you are promptly supplied. It
is worth while doing this, as there is
no other dressing just like Frank
Miller's.

Dealers—Write at once for dis-
counts. This is a profitable and
extremely satisfactory article to
handle.

THE FRANK MILLER CO., Inc.
350 West 26th Street
NEW YORK

For Refinishing Black Leather Auto Cushions and Seats Use Frank Miller's Bright Waterproof Cushion Dressing.



Jewell BATTERY GAUGE

**Now is the time of
battery troubles**

The summer heat causes rapid evaporation of the water
in the battery and in connection with the heat from the
water injures the insulation on the wires causing short
circuits and similar troubles.

None of these conditions are disastrous if promptly at-
tended to—but there's the rub.

There is also where the JEWELL BATTERY GAUGE
does its work.

It warns you promptly before any damage is done and in
ample time to remove the threatening cause.

*Not a Fad or an Ornament, but the most valuable accessory
ever put on a Car.*

IF YOUR DEALER DOES NOT CARRY IT WRITE US

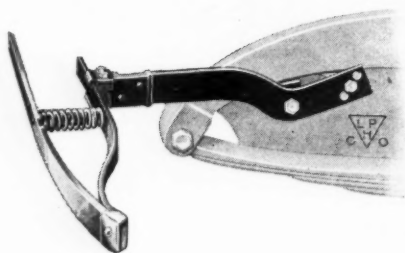
Manufactured by
The Jewell Electrical Instrument Co.
1646 Walnut Street, Chicago

Sole Distributors
Gray-Heath Company
1440 Michigan Ave., Chicago

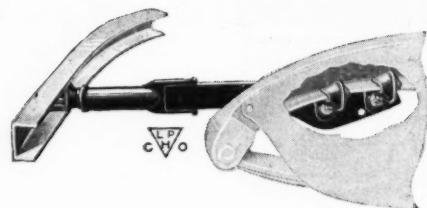
When Writing to Advertisers, Please Mention Motor Age

HALLADAY

NEW UNDER FRAME CLAMP BUMPER



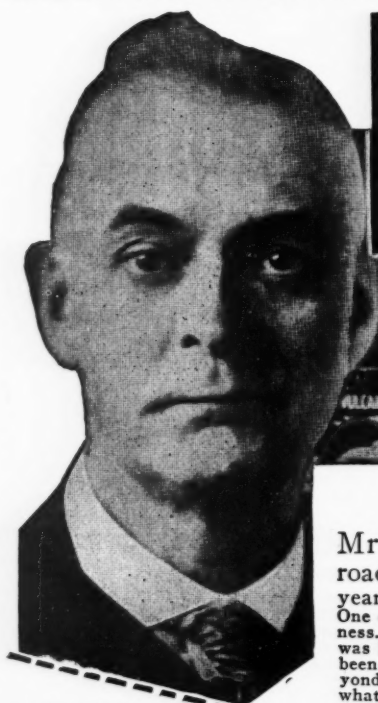
*The Most Thoroughly
UNIVERSAL
BUMPER
Ever Put on
the Market*



Attached in a Minute and STAYS Till You Take It Off

No cutting of any part; no rattle; no noise; steel extension and unbreakable clamps, fitted with all Halladay bars—Channel, Diamond Channel, Full Diamond, Round and our new Multiple Spring Bar, the strongest and most elastic bumper bar ever built.

L. P. HALLADAY COMPANY, Streator, Illinois



This Is Richard A. Oldham

Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. During all those twenty years, he drew the customary monthly salary of a telegraph operator—no more—no less. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Repair Business. In a few weeks he had purchased and installed a Haywood outfit, and was doing business for himself. He was **His Own Boss**. A short time ago he wrote us that his income in four months was as much as it had been in Two and One-Half Years as Telegraph Operator. You men who have been left at home—who are beyond the draft age, can and must take up the burdens left behind by others. Oldham is a living example of what can be done. I have 500 places to be filled now. 500 stations where tire repairing is neglected, because there is no one to do it.

**M. HAYWOOD, Pres.
HAYWOOD TIRE &
EQUIPMENT CO.
501 Capitol Avenue, Indianapolis, Ind.**

Dear Sir: Please send me your book on Haywood Tire Repair Plants and full particulars on your National Tire Repair Service and details of your FREE school of tire repairing.

Name

Address

I Must Have 500 Men to fill these places within the next sixty days

I have a big interesting book to send you—a book about tires—it explains this business—gives inside figures and profit. Gives actual proof of success—letters of others who are now operating Haywood Shops and making big money. What these men have done you can do. \$2,500 to \$4,000 a year is conservative. One machine will give you a start. You can see business all around you—everywhere there are automobiles there are tires that need repairing. You know that. All you do is open a shop—put out a Haywood sign, and auto owners will come to you and the service you bring them.

Sign the coupon and mail it today, or send a post card or letter.

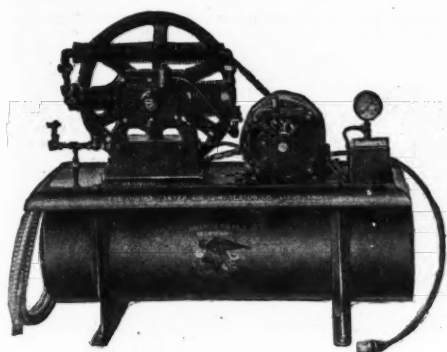
HAYWOOD TIRE & EQUIPMENT CO.

M. HAYWOOD, President

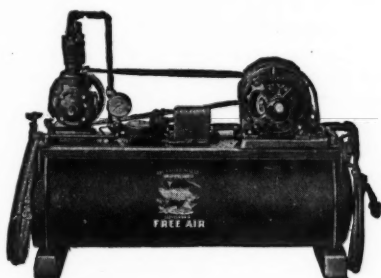
501 Capitol Avenue, INDIANAPOLIS



When Writing to Advertisers, Please Mention Motor Age



This is the U. S. DeLuxe Automatic Air Compressor, leader of the Two Stage line which comprises 17 numbers with capacities from 4 to 21 cubic feet per minute.



This is the U. S. D. 22, Automatic Air Compressor, leader of the Single Stage line, comprising 4 numbers with capacities from 1½ to 21 cubic feet per minute.



Machines of Many Features



EVERY United States Air Compressor is equipped with an efficient device to separate oil from the air and with thousands of machines in constant use for many years we have not received a single complaint from this source. We believe the least a purchaser can expect is a machine that will deliver air free from oil and because of this fact we do not consider it a matter worthy of extensive exploitation.

The United States Air Compressor was the first machine to contain a Patented Automatic Unloading Device which eliminates the need of starting a motor against pressure and thereby avoids the cause of burned out motors and the attending trouble.

Any unit of the 21 comprising, the United States line contains more refinements and improvements than any similar machine.

We ask prospective purchasers to examine U. S. machines from every possible angle and to compare them, point for point, with others. We ask you to buy them only when you are convinced they contain more points of merit than you can obtain in others. In buying air compressors, don't be misled by a comparatively unimportant argument, but go "beneath the surface" as a mechanic, and demand quality for your money.

The U. S. catalogue describing both Two Stage and Single Stage compressors in detail will be sent upon request. Send for it today.

Tear Out and Mail
Send catalogue as advertised in Motor Age to address written in the margin

The United States Air Compressor Co.
6534 Carnegie Avenue, Cleveland, Ohio

DRESS UP YOUR CAR WITH A DRIDEK TOP



The Most Remarkable Top Material Yet Produced

Light and strong, will not scratch or blister
Distinctive and attractive in appearance

Send for Samples and Price List to Dept. C

L. J. MUTTY COMPANY, Boston, Mass., U. S. A.



When Writing to Advertisers, Please Mention Motor Age

TENAX Compressed ASBESTOS

Sheet Packing Gaskets



Sheet Packing

A standard line of Asbestos Products—made right and priced right for the automotive jobber and dealer trade. Good discounts.

Tenax Compressed Asbestos Sheet Packing furnished in sheets 50"x50". Special size 50"x150".

Thicknesses of 1/32" to 1/8" inclusive.

Perfect gasket sheet stands temperature of 1200 degrees Fahr.

Tenax Gaskets make tight joints. Won't blow, burn or squeeze out. Extremely light weight.

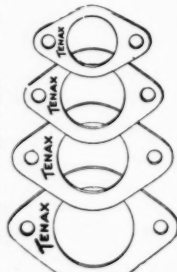
Brakebestos—a perfect asbestos wire inserted lining for truck and tractor friction brakes, clutches, etc. Heat, oil and water proof.

Vulcan Fan Belts are non-slipping, long life type and can be furnished in either endless or detachable style.

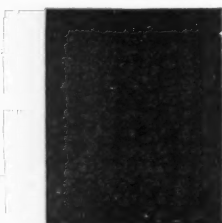
Send for liberal sales proposition.



Vulcan Fan Belts

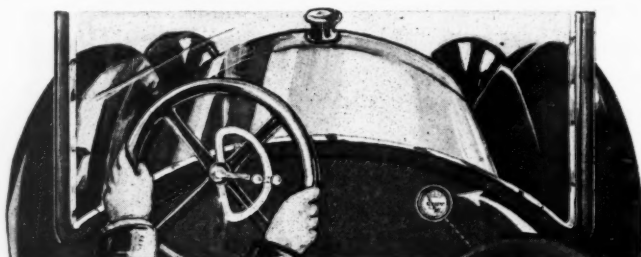


Gaskets



Brakebestos

ADVANCE PACKING & SUPPLY COMPANY
Tractor Dept. 13-15 N. FRANKLIN ST., CHICAGO, U. S. A.



Don't Run Out of Gas 20 Miles From Anywhere

You won't if you have the only dash-board gasoline indicator with the quantity of gas in your tank always registered on the dial before you. You will run out of gas if you trust to guess work or rely on float gauges, spring gauges or the stick method.

Gasograph

TRADE MARK

is the only dash-board gasoline indicator manufactured. You need one

on your old car, or when buying a new car, insist upon the manufacturer supplying a Gasograph instead of an old-fashioned tank gauge. No getting out of car to measure gasoline—no dusty, dirty tank gauge to clear before reading—no more pounding on tank to make needle work—no more guess-work. Just order the Gasograph and have registered before you the quantity of gas right on the instrument board and eliminates all chances of running out of gasoline and the resultant inconveniences. Prices are reasonable.

For car having tank in rear \$6.00 For car having tank under front seat \$5.00

Easy to install. No mutilation of the tank

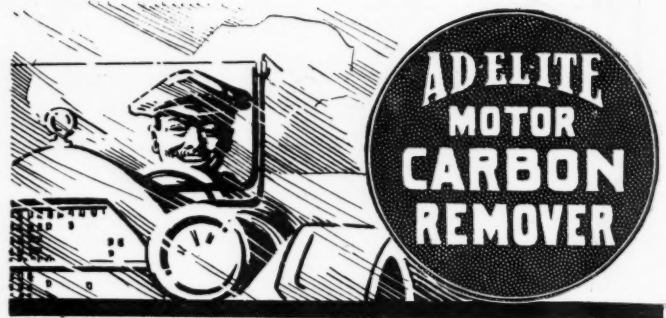
If your dealer cannot supply you, order direct. State make and model of car, or depth, shape and location of tank.

NEW STANDARD ADDING MACHINE COMPANY
Gasograph Dept., 22 South Spring Ave., ST. LOUIS, MO.

DEALERS: Write for proposition.



When Writing to Advertisers, Please Mention Motor Age



"Like New Again"

ALL the power—the "pep"—the speed and smoothness of the first day she took the road. Carbon had sapped her vitality. One cleaning with Ad-El-Ite Motor Carbon Remover put this car in tip-top trim. Every speck of carbon gone! "Knocking" stopped. Gas and oil consumption cut 12½ to 25%. Now she laughs at hills and hard pulls. No jerks—no groans. Steady—and instantly responsive. Try it on *your* car. Harmless to metals. No lay-up. Takes only a few minutes. Sold by leading dealers.

Send 25c for helpful book "Auto Troubles Cured," or free with a purchase of any of our full line of Ad-El-Ite auto, paint, varnish and chemical specialties.

Dept. C-7

ADAMS & ELTING CO.

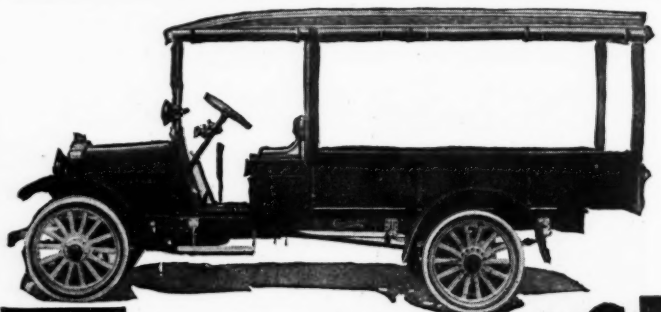
716-726 Washington Blvd., CHICAGO

69-73 Washington Ave.
BROOKLYN

17 Adelaide St., East
TORONTO

SPECIAL

Enough Ad-El-Ite motor carbon remover to thoroughly clean two or more cars will be sent prepaid anywhere in the U. S. for \$1.25.



Commerce

A Year Ahead of Other Trucks

The only truck having everything necessary on it—when you buy it

Three types of bodies for all models—Bijur Starting and Lighting System, with Dixie Magneto Ignition—Stewart Vacuum System—Pierce Governor—Windshield—Bumper. Continental Motor (3½x5)—Torbenson Rear Axle—Detroit Steel Products Company Springs.

One-ton Chassis	\$1340
With Express Body	1375
With Post Top and Storm Curtains	1450
With Standard Stake Body	1490

THE COMMERCE MOTOR CAR COMPANY
DETROIT, MICH.

W. H. Brinkerhoff, Eastern Dist. Mgr.
Belmont Ave., Elmhurst, Long Island, N. Y.

The Kimball

TIRE & RUBBER CO.

THE ECONOMY TIRE



KIMBALL TIRES cut down operating costs on any car. Their price, combined with the service they give, makes them a sensational tire value.

The material used in them is a good grade of live rubber and fabric that gives satisfactory service. These tires are sold without a guarantee. Write and ask us how we do it.

Since economy is the password of the hour, the prices of KIMBALL TIRES make them popular among car owners who want to save.

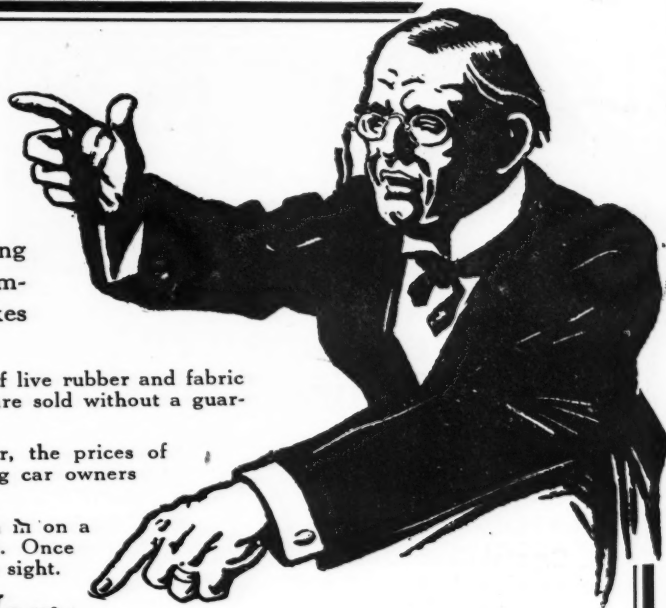
Dealers! Don't overlook this chance to cash in on a live, quick selling, money making proposition. Once the price is known, KIMBALL TIRES sell on sight.

Send Your Order Now

Delay will lose money for you. ACT, but act quick. Territory is going fast. Quick action will protect you. Get our agency and secure your share of the profits.

Look at the Prices! Send Cashier's Check or Money Order; take 2% for cash. A deposit of 25% of amount of order must accompany all orders.

The Kimball Tire & Rubber Co.
Dept. 18—1473 Michigan Avenue CHICAGO



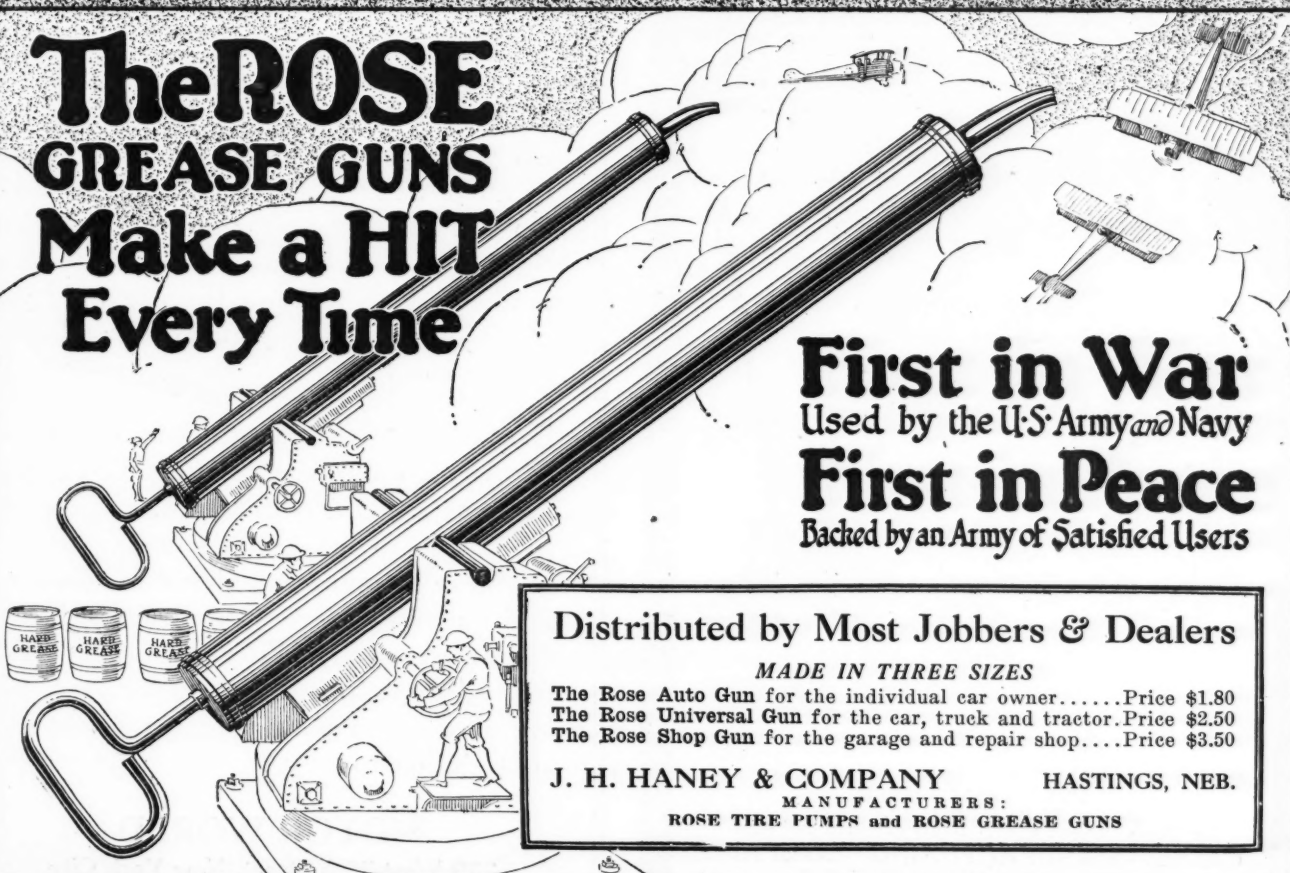
PRICE TO DEALERS

TIRES		TUBES	
30x3.....	\$ 9.05	30x3.....	\$2.00
30x3 1/2....	11.05	30x3 1/2....	2.25
33x4.....	18.55	32x3 1/2....	2.35
34x4.....	19.50		

The ROSE

GREASE GUNS

Make a HIT Every Time



First in War
Used by the U.S. Army and Navy
First in Peace
Backed by an Army of Satisfied Users

Distributed by Most Jobbers & Dealers

MADE IN THREE SIZES

The Rose Auto Gun for the individual car owner.....Price \$1.80
The Rose Universal Gun for the car, truck and tractor.....Price \$2.50
The Rose Shop Gun for the garage and repair shop.....Price \$3.50

J. H. HANEY & COMPANY HASTINGS, NEB.
MANUFACTURERS:
ROSE TIRE PUMPS and ROSE GREASE GUNS



Beauty of Glass a Factor in Selling Cars

Manufacturers of automobiles realize the value of beauty as a sales factor. Consequently they demand glass of high quality—at a reasonable price.

Crystal Sheet Glass, while considerably less expensive than plate, possesses every element of beauty and quality essential to high grade automobile construction.

It is strong, uniform in thickness, perfectly transparent, and of the proper degree of flexibility.

Ask us to explain in detail why Crystal Sheet is the logical glass for your cars.

AMERICAN WINDOW GLASS CO.

World's Largest Producer

GENERAL OFFICES: FARMERS BANK BLDG.
Pittsburgh, Pa., U. S. A.

MORE LITE AUTO LENS



MORE-LITE sales are mounting higher and higher every month. No other lens has risen so quickly in popular favor. Over 600,000 pairs were sold during the past year. There is a double reason—More Light, Less Cost.

Live dealers find MORE-LITE a paying proposition.

Crystal, \$1.50 to \$2.25. Amber, \$2 to \$3.

L. E. SMITH GLASS CO.

Office and Factory

MT. PLEASANT, PA.

At Our Risk— You Can Prove It

Don't waste good money on tire pumps that either break your back, or pump **Rubber Rotting Oil** particles or gasoline fumes into your tires.

Take No Chances

At our risk you can prove that the "**Dead Easy**" is quicker, safer, easier and cheaper than any other tire pump, either engine drive or hand power.

Convenient to carry with any car, it is always ready for instant service. The gauge showing exact tire pressure, there is no guesswork—and it's "**Dead Easy**."



FREE TRIAL OFFER

Write today, NOW,
for fifteen day—no money-in-advance—free trial offer.
GLOBE MANUFACTURING COMPANY
BATTLE CREEK MICHIGAN, U. S. A.

Are You Wise?

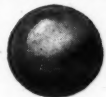
Do you know the detailed specifications of all passenger cars and motor trucks? Do you know the sizes and prices of all tires and tubes sold on the American market? Do you know the size and style of all electric bulb equipment for all passenger cars?

Every first of the month issue of Motor World presents the correct detailed specifications as above indicated. They are invaluable to men in the trade. Motor World is designed and edited for dealers, jobbers and garage owners exclusively. Published weekly. Fifty-two special and regular issues for two dollars per year. A big value—and getting bigger. Send your subscription to

MOTOR WORLD

239 West 39th Street, New York City

HOOVER
STEEL BALLS



Gain World Supremacy

FOR many years the United States was dependent upon Germany for its supply of high-grade steel balls.

That day has passed, never to return.

The Hoover Steel Ball, developed, perfected and produced in ample quantities to supply the requirements of America and Allies, is the superior of any steel ball ever previously manufactured in Germany, or anywhere else.

A complimentary copy of "The Evolution of the Steel Ball Industry" awaits your name and address.

HOOVER STEEL BALL CO.
Ann Arbor, Michigan, U. S. A.



Ohio Karbon Killer

Keeps Spark Plugs, Valves, Pistons and Cylinders free from carbon—all the time.

Don't let your engine choke up with carbon until it can't run, and then remove it—Prevent it!

Put Ohio Karbon Killer in your gasoline, and prevent the formation of carbon, thus keeping your engine in the very best condition at all times.

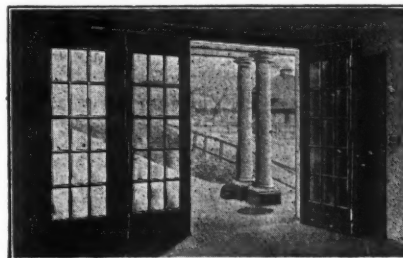
Costs \$1.00 per lb., and a pound treats 480 gallons of gas. Get a can right now, and give your engine a chance. If your dealer cannot supply you, send your dollar to

THE OHIO GREASE COMPANY
Box 121, LOUDONVILLE, OHIO

Slidetite (Patented)



Garage Door Hardware



CONVENIENT. Because simple to install, easy to operate. Accessible adjustments equalize effect of settling building walls.

ECONOMICAL. Saves heat. Saves space. Prevents damage from doors banging against car. Doors can't sag, can't swing in the wind. First cost reasonable. No aftermath of unexpected expense.

ORNAMENTAL. "Slidetite" hardware is installed inside the building out of sight and out of the way above the doorway. Gives opportunity for ornamental doorway corresponding with architecture of residence.

Adapted to any garage, private or public

Richards-Wilcox Manufacturing Co.

SAN FRANCISCO
LOS ANGELES
NEW YORK
CHICAGO

AURORA, ILLINOIS, U.S.A.

Richards-Wilcox Canadian Co., Ltd., London, Ont.

"A hanger for any door that slides"

PHILADELPHIA
MINNEAPOLIS
BOSTON
ST. LOUIS

"We Build Them and We Back Them Up"

SANFORD TRUCKS

Worm Drive 2½, 3½ and 5 Ton

One of four Sanford trucks owned by the Crucible Steel Co. of America

You get quality, service and real truck satisfaction in a Sanford. That accounts for our growing list of pleased dealers and owners. Sanford satisfaction leads to repeat orders.

Consider

The quality of the Sanford truck.
The men behind Sanford success.
Time tested standardized parts.
Attractive dealers' contracts.
Frequent circularizing.
Service that begins when truck is sold.
The sizes most in demand.

Immediate Deliveries

Sanford Motor Truck Co., Syracuse, N. Y.

The Hollenden Cleveland

"Home of the Cleveland Auto Club"

A DELIGHTFUL room at The Hollenden; the best in food and service, and most congenial surroundings will add greatly to the success of your trip to Cleveland whether for business or pleasure.

EUROPEAN PLAN WITH BATH
For One Person, \$2 to \$5
For Two Persons, \$3 to \$6
With Twin Beds, \$4 to \$6
Suites at Various Prices.

Ample garage facilities immediately adjacent
Official A. A. A. Hotel



Save a Life Instantaneous action is what counts. The **BUELL EXPLOSION WHISTLE** is a signal scientifically pitched to induce instant action in those in danger. It accomplishes results when even a fraction-of-a-second's delay might mean a serious accident. The instinct of self-preservation is roused at once by the abrupt warning of the BUELL.



Made in two models guaranteed for 10 years. Single Tone \$4.25. Chime \$6.00.
BUELL MANUFACTURING COMPANY
1608 South Michigan Avenue Chicago

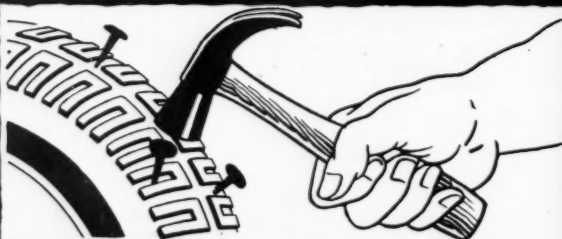
DEALERS: The Buell Explosion Whistle is in ever increasing demand. Are you prepared to handle your share of this business?

The "STERLING" UNIVERSAL JOINT

A real Joint—trouble and fool proof—properly lubricated and possessed of many new and unusual features

Western Sales Office:
1012 Ford Building
DETROIT, MICH.

THE BEARINGS COMPANY OF AMERICA
LANCASTER, PENNA.



DRIVE A NAIL IN YOUR TIRE

SOUNDS FUNNY, DON'T IT?

But we are not camouflaging. After treating your tube with

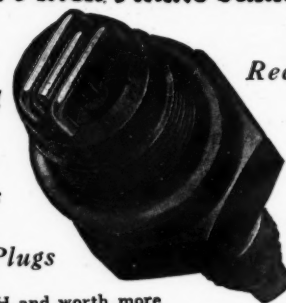
PUNCTURENE

Inflate your tire and get your hammer *AND GO TO IT* Puncturene seals the puncture instantly. Puncturene insures your tire against Punctures and Blowouts. Will keep your tires cool in summer; will not freeze them in winter. Write at once for guarantee and particulars. Agents wanted.

AUTO NECESSITIES CO.
AUSTIN, MINN.

A 1-INCH FIRING SURFACE

Ideal
for all
Internal
Com-
bustion
Engines
Using
Spark Plugs



Specially
Recommended
for
Heavy
Duty
in Trucks
and
Tractors

\$1.00 EACH and worth more
BERGIE NATIONAL SPARK PLUG CO., Rockford, Ill.

GET FULL MEASURE OF SPRING

WEAR



The far-reaching Guarantee under which **HIGGINS QUALITY SPRINGS** for Replacement are sold—years of successful usage back of them—the new, improved principle of construction give you positive protection against imperfections—breakage and bother. Best for the dealer because they deliver greatest worth in wear to user. Write for Trade Discounts and Big Catalog C-1917, listing 500 different styles.
HIGGINS SPRING & AXLE CO., Dept. 21, Racine, Wis.

NO BOLT — NO HOLE — NO HUMP — NO JOLT



Immediate shipment, VULCAN seven leaf heavy, oil tempered, fronts for the Ford. 588 other types, 90,000 springs in stock. Liberal discounts.

JENKINS VULCAN SPRING CO.

Factory and General Offices, Richmond, Indiana
Branches with full stocks

St. Louis, Missouri	- - -	1402 Chestnut Street
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Valve-in-head four cylinder motor

Forty-five horsepower

Twenty-five miles to the gallon

Write for detailed specifications and dealer proposition

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Sells for \$4.00
Worth the price of car

Is the "Standard" Ford Ignition Lock. Always demand the Defender, and take no imitations. The Defender safely locks the coil-box, and is the only lock that grounds the electrical system; this makes them thief-proof.

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AND ALLOW 15 PER CENT OFF ON INSURANCE

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Light Delivery 1, 2, 3½ and 5-Ton

Write for full information on the Selden Line



DEALERS: Write or wire for desirable territory

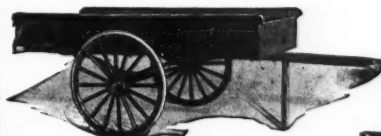
Selden Truck Sales Company
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155 motor car builders and motor truck builders use
ECLIPSE
BENDIX DRIVE
as standard equipment

AN
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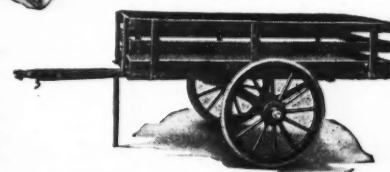
Manufactured by
ECLIPSE MACHINE CO.
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Built by men who are pioneers in the industry, of the best materials obtainable, and sold at a price that is right.

Built in six different models, a size for every load and car. Write us for our dealer's proposition and complete information.

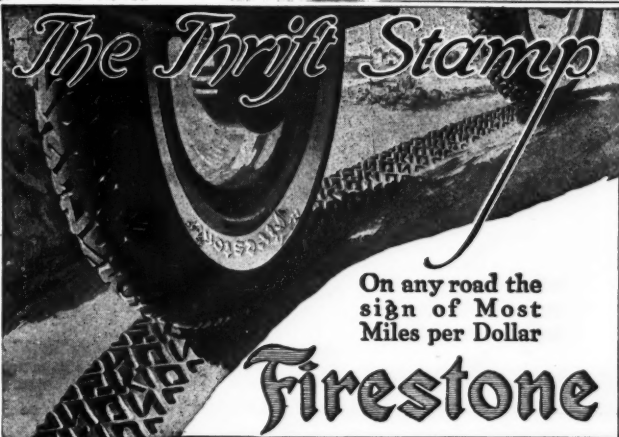


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" Uniformly Dependable "

The Wheeler-Schebler Carburetor Co. Inc.
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On any road the sign of Most Miles per Dollar

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GUARANTEE VISIBLE PUMPS

Fast service, full measure and perfectly filtered gasoline, assure dealers the constant patronage of satisfied customers.

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*"Put the Blame
on the
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An automatic safety device that operates off the brake rod. If your Dealer does not handle, send in his name or order direct. Retail Price \$12.50.

Dealers write for special proposition.

The Wonder Sales Co.

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Chicago-Built Motor Cars

5-Passenger Touring	\$1,165	4-Passenger Roadster
All-Weather Sedan	\$1,645	Military Scout Model \$1,245

Every Elgin Six Combines Distinction,
Endurance, Economy and Comfort

Elgin Motor Car Corporation 2427 South Michigan Blvd.
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Guaranteed for 10,000 Miles Bricton Pneumatic Tires

Every Bricton Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser. Bricton Tires are Puncture-Proof, and proof against blowouts, skidding, ruts, rim-cuts, oil and gasoline. Wonderful resiliency, easy riding qualities and economy commend them to every car owner.

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Does It Lubricate the First Five Minutes?

That's the question that floors common Grease. Grease has to be partly melted with frictional heat before it acts at all.



begins to lubricate the instant the car starts and prevents bearings from heating. NON-FLUID OIL provides positive protection to all parts from frictional wear and reduces power consumption.

Use "KOO" Special grade for gears, "KOOO" for bearings and differentials that are not oil tight. Packed in orange-colored cans; sold by best dealers everywhere.

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easily worked when there.*

Smooth — sure —
quick-acting.

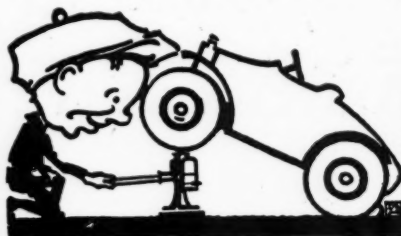
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Hartford
AUTO JACK

Its army of users say
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*"The Best Jack
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"THE EASY LIFTER"

Turn Waste Space
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Ask For
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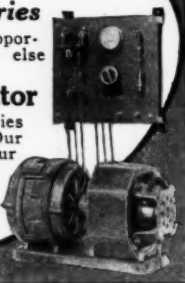
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offers garage men a bigger opportunity for profits than anything else they can do.

Our 3-G Motor Generator

charges from one to eight 6-volt batteries at one time. Anyone can operate it. Our 9-G Generator charges one to twenty-four batteries at a time.

There are over 8,000 of our vibrating type Battery Chargers in use. Write for particulars.
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High Compression
PISTON RINGS
"The Accepted Standard"

BURD HIGH COMPRESSION RING CO.
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Sales Offices in All Principal Cities.

BROWN-LIPE TRANSMISSIONS

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Factories and General Offices
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CENTURY CRYSTALLIZED PLATE STORAGE BATTERY

Century batteries are built and sold for replacement only. They are standardized batteries with Universal Terminals. 6-V. 80-Amp. (square), 6-V. 80-Amp. (long), 12-V. 40-Amp. Just 3! Think of it! Three! They replace 51 shapes and sizes and combinations of other makes of batteries and make 95% of all replacements.

Universal Terminals means easy service.

Standardizing means cheaper manufacturing.

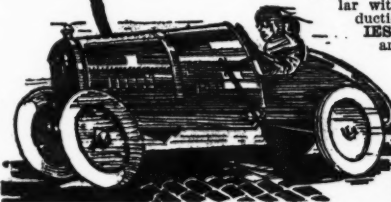
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Own a lively, snappy looking PACO RACER. Modeled on French streamline design. Fits any Ford Chassis. PACO BODIES are patented. None others like them. Strong molded steel body. Low hung they cling to the road. Comfortable seats and easy riding. Shipped complete with all attachments.

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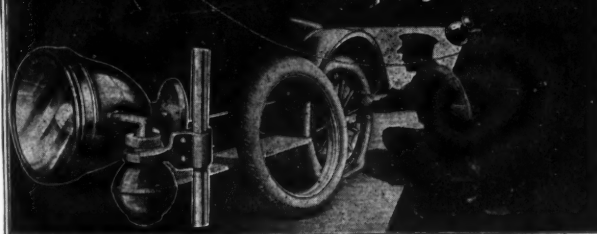


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Makes Tire Changing as Easy by Night as by Day

More than just a Spotlight.



ANDERSON ELECTRIC SPECIALTY CO.
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Winton Six

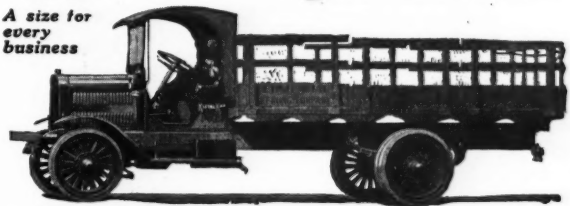
The automobile is a great builder of good cheer: more needed now than ever before. It drives away your troubles, your doubts, your gloom, and makes you glad to be alive, glad to hold up your end, glad to do your mightiest for the rescue of mankind.

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A size for every business



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Price \$25.00

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Free From Oil means fewer punctures, increased mileage and less repairs. The Curtis Air Compressor is the only one that can't flood the cylinder with oil, because of exclusive mechanical safeguards.

Costs Little—Minimum Upkeep

Made in 5 sizes and 125 combinations. Costs no more than any other kind.

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BALL BEARINGS PROPERLY REGROUND

have all the qualities of new
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Distributors of Hess-Bright new bearings. Complete stock of all types of ball bearings.

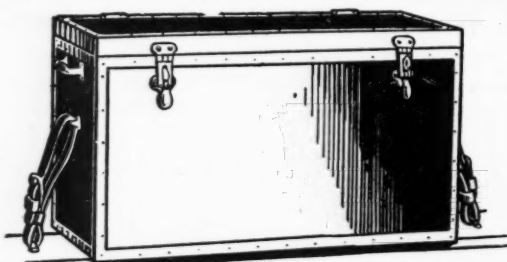
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OR DRINKS, WARM OR COLD, AS DESIRED

NO Outing Complete Without It. Write for Folder

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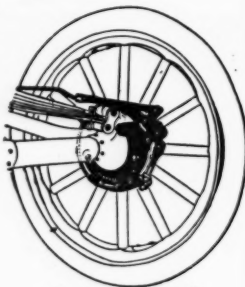
This morning's mail (July 1st) brought in repeat orders from dealers for 122 sets Pla-Safe Emergency Brakes. This is the best evidence in the world that our brake is a product of merit and is becoming one of the fastest selling Ford accessories on the market. Orders are coming in from all over the United States, as well as Australia, South America and Canada.

Price, \$10.00 per set

Write us today for our discount and big selling plan

The PLA-SAFE COMPANY

Successors to L. A. Leathers Co.
BROOKVILLE PENNSYLVANIA



Easy to install
No holes to drill

Waukesha 4-CYLINDER MOTORS For Trucks and Tractors

Sizes 3¼ x 5¼ to 4¾ x 6¾

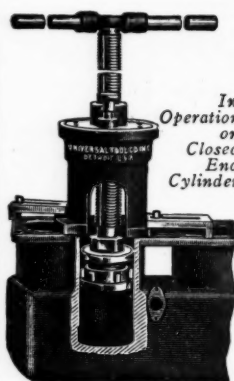
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UNIVERSAL JOINTS**
Positively Lubricated
Can-Less Joints in Six
Sizes for Pleasure Cars,
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In
Operation on
Closed
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The New Improved Universal Cylinder Reboring Tool Is Mistake Proof

As simple in design as it is effective in action. Construction insures an absolutely rigid tool, with perfect centering device. Other new and revolutionary improvements that make cylinder reboring easy for any one to do.

Range of Expansion 2½"-5 1/16"

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C. A. SHALER CO., 226 4th Street, Waupun, Wisconsin
Largest Manufacturers of Vulcanizers in the World

GEARLESS DETROIT CRANK-SHAFT Tire Pump

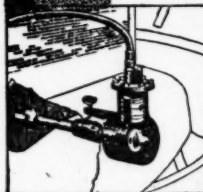
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960,000 PROSPECTS
With Cars Between \$800 and \$1300

Now ready for Briscoe, Dodge, Chandler, Hudson, Overland, Reo, Hupmobile-R. and Studebaker cars. On and off in a jiffy without tools. Not a rubber diaphragm device. Write for details. Dealers, ask for discounts.

Price \$12

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PHILBRIN DUPLEX IGNITION

—with a second system to
spur the motor to super-service

COMBINES two separate and distinct systems in one—a Single Spark System, most economical of gas and offering vastly increased power. A secondary or High Frequency System which delivers to each cylinder a stream of a thousand sparks a second—overcomes abnormal conditions, such as foul spark plugs, poor fuel, poor carburetion, and cold cylinders—offers 100% assurance against ignition failure. Easy to install, moderate in price. Descriptive catalogues and our special sales proposition on request.

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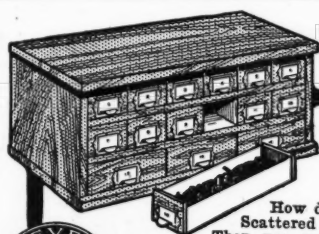
Delivery Problems Are Solved by *Standard* WORM DRIVE TRUCKS



2,
3½
and
5
TON

Prompt deliveries of all capacities. Quality, price and demand insure good business. Write for our proposition.

GOOD TERRITORY OPEN
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FOR YOUR GARAGE

How do you keep your parts and tools? Scattered about—gathering dust and rust? Then you need a

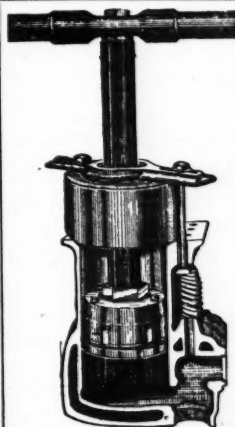


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Its 15 steel-body drawers will take care of those neglected parts and tools—keep them clean and instantly accessible. Made of strong, fumed oak. Mighty useful in the house, too.

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Make More Profit Storm Reboring Machine

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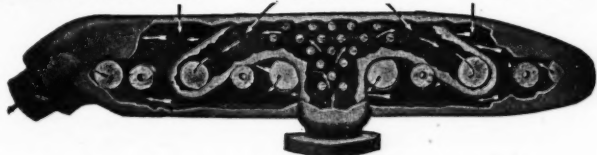
The most practical machine for any type of motor. SIMPLE, SPEEDY, ACCURATE and RELIABLE for hand or power. No shop complete without one. In daily use in all parts of U. S. A. and foreign countries. Shortage of new cars makes it indispensable in large and small shops.

We furnish machines of varied capacities from 2½ in. up. Also special Ford Machine. For sale by leading jobbers. Oversize pistons for all makes of motors.

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HOT-PIN MANIFOLD for FORDS

Exhaust and Pins	This Hot-Pin Chamber	Exhaust Gases Heat
Assure Uniform Heat	Breaks Up All the Fuel	the Pin Chamber.
Treatment of All Fuel	NO WASTE	On All Sides



40% to 50% Increase in Gasoline Mileage
Guaranteed or Money Refunded. Enlivens
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Price \$16.50 complete. Send for Literature. Dealers Wanted

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RUSCO

BRAKE LINING and CLUTCH DISCS

have for years been used as
standard equipment by several
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Is your car "Rusco" equipped?

THE RUSSELL MANUFACTURING CO.

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KINGSTON CARBURETOR

Save Money by Economizing Gasoline

Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed regardless of hot, cold, wet or dry weather.

Write for details and let us tell you why so many manufacturers are adopting this carburetor as standard equipment.

MADE BY THE OLDEST MANUFACTURERS OF CARBURETORS IN AMERICA
ESTABLISHED 1895

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Price
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Automatically fits every nut used in connection with demountable rims on all makes of cars. Now beautifully finished in nickel and black enamel. More compact and lighter. Improved throughout. Selling on sight. Complete only \$1.50.

Write for complete details
Dealers, ask for liberal discounts
THIS NEW WRENCH SELLS

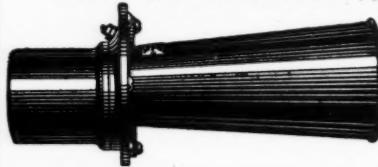
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You're Taking Long Chances

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MODEL 354 AMMETER

On Your Dashboard or Cowl

It is the reliable means of determining the proper rate of charge or discharge of your battery for various speeds. It enables you to determine that the generator is working and that the storage battery is receiving its proper charge. Write us!

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Leatherwore
"Is like the kick in most respects
in some respects is better"

The long-wearing, rich-appearing motor-car upholstery that can be used to better advantage than genuine leather.

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The "Big Stick" That Brings Down Gasoline Expense

Up goes the price of gasoline! Maximum mileage is the big problem of the day! Solve it with the new Stromberg Carburetor.



New STROMBERG Does it!
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THE GOLDEN
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"IT SELLS
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BENFORD
MFG. CO.

MT. VERNON,
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Steel Tires & Mud Chains



Old Tires Covered Complete

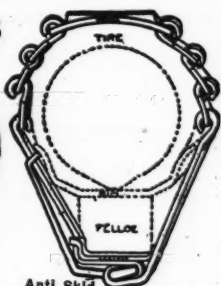


NO MORE PUNCTURES

Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special Prices to Those in New Territory

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Anti Skid

Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

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The big advantage of this drill lies in the fact that you do not have to let go with either hand in order to stop it when the bit breaks through. You just pull the trigger and cut off the current.

The steadiest, most satisfactory and economical hand drill ever made.

Universal Motor (any current), ball thrust bearings, Chrome vanadium steel gears, forced draft cooling system. Fully guaranteed.

Write for full description

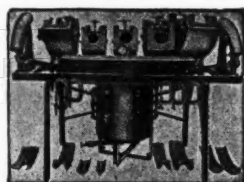
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Sales Representatives in England

BUILD UP BIG BUSINESS—MAKE BIG MONEY

Open a tire repairing shop. Men starting without experience—now making big money. We instruct you free. Outfit pays for itself. We have 1,000 more vacancies to fill. Golden opportunity.

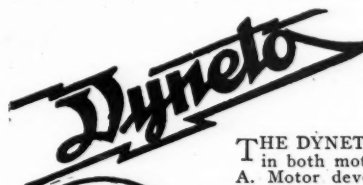


But be sure—get the RIGHT Outfit. There is but one that operates upon CORRECT principle—the

Vanderpool Vulcanizer

Only vulcanizer recommended by leading tire factories because the only one that repairs tires EXACTLY as THEY WERE MADE.

VANDERPOOL CO.,
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STARTING LIGHTING SYSTEMS

THE DYNETO shows greatest efficiency in both motor and generator. Type D. A. Motor develops a torque of approximately 15 pounds. Type C. A. Generator shows approximately 15 amperes.

A car-speed of 15 to 20 M. P. H. keeps batteries fully charged.

Starter always sure to start. Lamps always bright.

Send drawings and specifications for our recommendation.

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Inner armor for automobile tires prevents punctures and blow-outs. Double mileage of any tire, old or new. Easily applied without tools. Used over and over in several tires. Will not heat or pinch. Cheaper and better than double treads, etc. Details free. Distributors and agents wanted. Sales guaranteed.

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BRISCOE \$885

THE CAR WITH THE HALF-MILLION DOLLAR MOTOR

The Real Utility Car

BRISCOE MOTOR CORPORATION

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GOODRICH IGNITION LOCK

The new Goodrich Steering Column Lock fits all cars—Can be installed by the owner himself. Write for literature.

GOODRICH-LENHART MFG. CO., 419 Widener Bldg., Philadelphia

USED ON 90% OF ALL FULLY EQUIPPED CARS

KELLOGG ENGINE DRIVEN TIRE PUMP

KELLOGG MANUFACTURING CO. ROCHESTER, N.Y.



BEST SELLING ACCESSORY on the MARKET

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Magnetic-Motors Car Co.

Philadelphia, Pa.

KNOX CARBURETOR

Saves 10% to 30% Fuel

A True Automatic Multiple-Jet Carburetor, with Only One Moving Part. Self-adjusting to any weather, altitude, or motor conditions. Unconditionally guaranteed. Write for full particulars.

Manufacturers of KNOX Motors, Carburetors, Launches

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The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

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Internal Gear Drive

Dependable Delivery

BETHLEHEM MOTORS CORP'N. ALLENTOWN, PA.

The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

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**Absolutely Accurate
Crankshaft Machining**

Unless you are absolutely satisfied with the crankshaft machining you are now getting it would pay you to investigate our ability and equipment

"MOLTRUP FOR QUALITY"

Moltrup Steel Products Co. Beaver Falls, Pa.



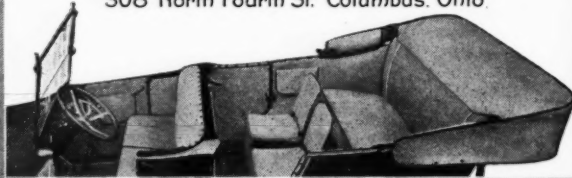
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EASY-ON SEAT COVERS
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WE HAVE
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Sold by leading Jobbers and Dealers everywhere
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PASCO WIRE WHEELS

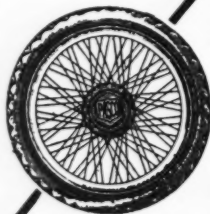
are best because of three exclusive patented features—

1. A tangent method of spoke lacing giving a stronger web.
2. The hub cap made of an indestructible metal—unaffected by jams and collisions.
3. The Safety Locking Device—locking the wheel on.

Pasco means Strength, Safety, Economy and Distinctive Beauty.

Write for dealer proposition

National Wire Wheel Works, Inc.
Geneva, N. Y., U. S. A.



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SCIENTIFIC IGNITION

ADDRESS ALL COMMUNICATIONS TO
4934 STENTON AVE., PHILADELPHIA.



ON FARM TRACTORS, continuous efficient performance is insured by the installation of these oil-less bushings at places difficult to lubricate.

BOUND BROOK & NIGRUM OIL-LESS BUSHINGS

TRADE MARK REG. U. S. PAT. OFF.

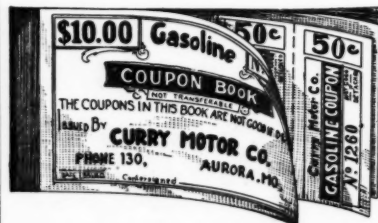
All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

**BOUND BROOK
OIL-LESS BEARING CO.**
Specialists in the manufacture of Oil-less Bushings for more than a third of a century

Bound Brook, New Jersey



STOP WRANGLING



Over disputed accounts. Our Coupon Books, for cash or credit sales, eliminate disputes, reduce collection expense, bring bookkeeping to an economical basis, get the cash or control the credit. Books made to suit the trade. The one safe and sure system.

Write TODAY for samples and prices, stating denomination and quantity desired.

COMBINATION CARD COMPANY
AURORA, MISSOURI

ZENITH CARBURETOR

KNOWN the world over as the *zenith* of carburetor efficiency. A long list of American builders of cars, trucks and aeroplanes believe this simple, plain tube device to be the best insurance for permanent carburetor satisfaction.

Zenith Carburetor Co.
New York Detroit, U. S. A. Chicago

STA-TITE PISTON RINGS

ELIMINATE
ALL PISTON
RING TROUBLES

THE RING COMPANY
SPECIALISTS IN PISTON RINGS
MUSKOGEE MICHIGAN

THE CLEARING HOUSE

OF THE MOTOR INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY, REBUILDING, REPAIRING, WELDING AND USED CARS.
ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING

AUTO SALVAGE
BULLETIN
No. 1

ANNOUNCEMENT

THE The Auto Salvage Co., Inc.

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of

ST. LOUIS, MISSOURI

KANSAS CITY, MISSOURI

CINCINNATI, OHIO

"Await Your Commands"

"The World's Largest Used Parts Concern"

Stocking over 600 different models of cars, and over 110 different manufacturers' makes.

Will offer each week on this page a Bargain Sheet or Bulletin of used parts prices at a great saving of

35 to 90%

—OFF—

Manufacturers'
Old Price List

We may not be the nearest to you but we will go the farthest to serve you

WATCH NEXT WEEK FOR BULLETIN

No. 2

"It will save you money to watch 'em"

AUTO SALVAGE CO., INC.

ST. LOUIS, MISSOURI

INC. KANSAS CITY, MISSOURI

CINCINNATI, OHIO

"The Used Parts House of America"

Satisfaction Service

Economy Reliability

One inquiry to us gets the used part if it is in Kansas City, "The Heart of America." Our service does more for you than a mere reply "We have it or don't have it." We get it for you, or tell you where you can get it.

The list of cars for which we can furnish parts is too long to catalog here.

Compare these prices. We can always save you money.

MOTORS

Buick Unit Power Plant.....	\$100.00
Cadillac, 1910	50.00
Everett 30	50.00
Overland 79, 1914.....	50.00
R. C. H. 1914-15.....	40.00
Studebaker 4-1916, Ser. 17.....	50.00
Studebaker 25-1913	40.00

RADIATORS

50, guaranteed, for:

BUICK, CHALMERS, KING, JEFFERY, HUDSON, PATTERSON, OAKLAND, PAIGE 1918, OVERLAND, PACKARD 30, REO.

Tell us what you want.

CYLINDER BLOCKS AND PISTONS, TRANSMISSION GEARS AND CASES, BEARINGS, CRANK CASES, REAR AXLES COMPLETE OR PART, GEARS, SPRINGS, CARBURETORS, MAGNETOS, WINDSHIELDS, WHEELS, RIMS, GAS TANKS, ALL MAKES AND SIZES, \$1.00 TO \$2.00.

NEW STREAMLINE HOODS FOR FORDS, PRIOR 1917, \$2.50 EACH.
NEW SPARK PLUGS, 35c TO 75c.

Give us all information possible with your first inquiry. Give make, model, year, dimensions, or send in old part. Parcel post shipments are quickest. Make your inquiry an order, and save time.

Write, Wire or Phone Us

U. S. MOTOR PARTS COMPANY

401-406 East Eighteenth Street, KANSAS CITY, MO.

Rapid Fire Service and Lowest Prices ON GOOD SERVICEABLE PARTS FOR ALL CARS

If We Cannot Satisfy You, Money Cheerfully Refunded

SPECIAL MOTOR BARGAINS

All in excellent condition	
4 cyl. 1914 Mitchell.....	\$100.00
4 cyl. 1913 Big Mitchell.....	100.00
4 cyl. 1914 Mitchell starter and generator.....	125.00
1914 Oldsmobile (Defender model).....	100.00
4 cyl. Oldsmobile (Autocrat model).....	150.00
6 cyl. Thomas Motor (cast in pairs).....	125.00
1911 Packard.....	100.00
1912 36 Pierce Arrow.....	125.00
New Marion Motor.....	100.00
4 cyl. 1914 Moon with starter.....	100.00
4 cyl. 1913 Buda.....	85.00
1913 Atlas.....	75.00
6 cyl. 50 H. P. Rider-Lewis (fine for boat).....	100.00
1914 Marmon.....	100.00
1915 Krit.....	65.00
83 Overland with starter.....	85.00
6 cyl. 1914 Jeffery with starter and generator.....	125.00
6 cyl. Everitt.....	85.00

UNIT POWER PLANTS

4 cyl. Continental—complete.....	\$100.00
4 cyl. Milwaukee—complete.....	100.00
1914 Lozier 6.....	200.00
1914 Premier with starter.....	150.00
4 cyl. Chalmers 30.....	65.00
6 cyl. Stevens-Duryea—complete.....	150.00
4 cyl. 1913 Abbott-Detroit with starter and generator.....	150.00

1914 Allen.....	\$115.00
1917 6 cyl. Regal.....	100.00
1915 6 cyl. Master Chalmers.....	150.00
1916 6 cyl. Chalmers 30.....	125.00
1914 6 cyl. Cole.....	135.00
1914 6 cyl. Oldsmobile.....	135.00
Buick 35.....	100.00
1916 Le Roi.....	65.00
Hupp 20.....	40.00

Liberal allowance made on your old motor

Cylinder Blocks, Pistons, Shafts, etc., for most all motors

MAGNETOS

Overhauled and Guaranteed	
DU4 Bosch Set Spark.....	\$18.00
DU4 Bosch Variable Spark.....	22.50
DU6 Bosch.....	27.50
DR4 Bosch.....	18.00
DR6 Bosch.....	22.50
D4 Bosch.....	15.00
D6 Bosch.....	17.50
NU4 Bosch.....	15.00
ZR6 Bosch.....	35.00
Eisemann Dual.....	15.00
Remy Model RL & D.....	7.00
Dixie Mags.....	12.00

We carry in stock all magneto parts

GENERATORS

Gray & Davis.....	\$15.00
Ward Leonard.....	12.00
Remy.....	18.00
Vesta.....	12.00
Beardon.....	12.00
Apple.....	10.00

STARTERS

Gray & Davis.....	\$15.00 to \$20.00
Remy.....	15.00
Ward-Leonard.....	20.00
Auto Lite, Bendix Drive.....	25.00
Auto Lite, Gear Drive.....	20.00
Wagner.....	25.00
Westinghouse.....	25.00
Delco.....	25.00

COILS

Bosch Type A.....	\$7.00
Eisemann.....	4.00
Splitdorf.....	4.00
Simms, H. T.....	12.00
Mex.....	10.00
Silent Starter and Generator Chains; all lengths and sizes.	

NEW HEADLIGHTS

Gray & Davis 12-in. face, two.....	bulb type.....\$5.00
Special 12-in. face, two bulb type.....	4.00
New steering posts.....	5.00

SECOND-HAND CAR DEPT.

\$150.00 to \$550.00

50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

PREST-O-LITE TANKS

B-Presto Tanks.....	\$5.00
E-Presto Tanks.....	4.00
Searchlight.....	3.00

300 new Adjustable T Bumpers, nickel or black, fit all cars except Fords.....\$4.50 each
14,000 ft. new radiator hose, price per ft., 1-in., 20c; 1¼-in., 25c; 1½-in., 30c

SPEEDOMETER HEADS

Stewart or Warner.....\$1.50 to \$4.00

RIMS

All Styles and Makes

Stanweld.....	\$2.50
Funk.....	2.00
Reversible Firestone.....	2.00
Continental.....	2.50
All other makes.....	1.50

TIRES AND TUBES

We wreck many cars every day and thus obtain great quantities of exceptionally good Tires and Tubes at prices that will interest you.

New Steering Posts.....	\$5.00
Front Axles.....	\$5.00 to \$10.00
Rear Axles.....	15.00 to 40.00
Radiators.....	10.00 to 35.00
Transmissions.....	15.00 to 100.00
Carburetors.....	5.00 to 9.00
Bearings.....	.50 to 3.50
Springs.....	1.00 to 3.50
Transmission Gears.....	1.00 to 5.00
Differential Gears.....	5.00 to 10.00
Axle Shafts.....	2.00 to 8.00
Gasoline Tanks.....	1.00 to 5.00
Lamps.....	.50c to 5.00
Windshields.....	3.50 to 8.00
Spotlights.....	3.50
Stewart Vacuum Tanks.....	4.00
Carter Tanks.....	2.50

Mail Orders Shipped Same Day

WARSHAWSKY & CO.,
Phone Calumet 7315

Highest Prices Paid for Wrecked Cars

Largest Car Wreckers in the West
1915 S. State St., CHICAGO, ILL.

PRICES SHATTERED!!

Used Parts for 300 Makes of Cars

Write

Phone

Wire

AUTO PARTS COMPANY

Davenport, Iowa

St. Louis, Missouri

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MOTORS (Guaranteed)

Abbott	\$75.00
Buick, Model 10	60.00
Buick, Model 25	90.00
Case, Model 40	75.00
Cadillac, Model 1914	150.00
E. M. F., Model 30	50.00
Flanders, Model 20	50.00
National	75.00
Packard, Model 1909	85.00
Premier 6 cylinder	100.00
Reo 1910	60.00
Mitchell 6 cylinder	75.00
Overland 42	50.00
Overland 59	60.00
Velie	75.00
Marmon	90.00
Rutenberg	125.00
Michigan 40	100.00

UNIT POWER PLANTS

Chalmers 6, 1913	\$125.00
Haynes	90.00
Hudson 6, 54	175.00
Hudson 37	150.00
Imperial	100.00
Krit	90.00
Velie	125.00

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NEW SUPPLIES (Below Market Price!)

Motor Driven Klaxet Horns, each	\$4.00
Electric Head Lights for Fords, pair	3.75
Head Lamp Doors for Fords, each	.65
Vulcanizer Kits, each	.75
3-in. Innershoes, each	.30
3 1/2-in. Innershoes, each	.34
Axle Shafts for Fords, each	1.40
Electric Side Lamps for Fords, pair	2.50
Oil Side Lamps, pair	2.75
A. Y. Hand Horns, each	2.25
Piston Rings for Fords (lap joint), each	.11
Piston Rings (all sizes), each	.30
Patches (for tube), box	.10
Spark Plugs (special), each	.25
Brake Shoes for Fords, each	.25
Body Polish (best), bottle	.45
Brake Lining, 1 1/2-in., foot	.36
Brake Lining, 1 3/4-in., foot	.38
Brake Lining, 2-in., foot	.41

MATERIAL

(Below Market Price!)

Genolite Ignition Systems (Fords)	\$18.00
Remy Ignition Coils	6.50
Wagner Starters	15.00
Autolite Generators	18.00
Taper Pins	
Lock Washers	
Cotter Keys	

ALSO BELOW MARKET PRICES!

THE ORIGINAL **AUTO PARTS CO., Inc. of ST. LOUIS**
ST. LOUIS, MISSOURI

Branch: Auto Parts Co., Davenport, Iowa

Our New Bargain List—Order Now

PLAY SAFE!

You lose nothing
through caution.

We guarantee every
part to be exactly as
represented or we will
refund your money.

Highest Banking
References

MOTORS

R. C. H.	\$40.00
Flanders 20	50.00
E. M. F.	50.00
Studebaker 25	50.00
Studebaker 4-15	75.00
Overland 56	75.00
Overland 69	75.00
Overland 6, Continental	100.00
Peerless 45 H. P.	50.00
Partin Palmer	50.00
Firestone Columbus	60.00
Mitchell 4-40	75.00
Stoddard Dayton 30	60.00
Stoddard Dayton 45	75.00
Case 1911	75.00
Cadillac 1911	75.00
Cadillac 1912	75.00
Kissell 40	75.00
American 30	75.00
Moon 1912	75.00
Stearns 1911	75.00
Henderson 4 cyl.	75.00
Buick 19	85.00
Locomobile 1910	90.00
Chalmers 6, 1915	100.00
Apperson 8 cyl.	100.00
Packard 6-48, 1914, with Starter, Generator and Bosch Magneto	300.00

UNIT PLANTS

Haynes, 1910, Unit Plant	\$75.00
Chalmers model 17	100.00
Menominee Truck	100.00
King 1914	100.00
Auburn 1914	100.00
Elcar 1916	125.00
Allen 1916	125.00
Paige 6, 1917	200.00

STARTERS

Gray & Davis, Maxwell	\$17.50
Remy, Mitchell 4-6	15.00
Ward Leonard	15.00
Auto Lite	12.50
Wagner	20.00
Bosch Fly Wheel Type	25.00
S-202, less fly wheel ring gear; Jesco 16-volt	20.00

GENERATORS

Auto Lite	\$17.50
Gray & Davis	20.00
Ward Leonard	15.00
Vesta	12.50
Beardon	12.50
Apple	12.50
Eskridge	12.50

MAGNETOS

Splitdorf Dixie	\$20.00
Mea	25.00
Bosch D-4	17.50
Bosch N-U-4	20.00
Bosch D-R-4	25.00
Bosch D-U-4	30.00
Bosch D-6	25.00
Bosch D-R-6	35.00
Bosch Z-R-6 and coil	50.00
Bosch Z-R-4 Dbl. Distb.	125.00

PARTS

Rear Axles	\$25.00 to \$50.00
Front Axles	5.00 to 15.00
Radiators	10.00 to 20.00
Transmissions	25.00 to 50.00
Bearings	.50 to 5.00
Springs	1.50 & 2.50
Spring Leaves	.25 & .50
Gears	1.50 to 15.00
Axle Shafts	2.00 to 10.00

AUTO WRECKING CO.

13th and Oak
Kansas City, Mo.

Parts and Repairs.

Parts and Repairs.

Parts and Repairs.

REAL BARGAINS Low Prices Puritan Quality

All parts for many cars, many parts
for all cars; tell us what you need.

PURITAN ELECTRICAL SUPPLIES

6 volt Autolite Generators, model GG, brand new	\$12.50
6 volt Ward Leonard Starting Motors, brand new	15.00
6 volt Ward Leonard Generators, brand new	15.00
Ward Leonard Controllers, brand new	8.00
Connecticut G. Lighting and Ignition Switches, new	6.00
Connecticut G. A. Coils, new	7.50
Cuno Starting Switches, new	2.50
Bosch D. U. 4 Magnets, variable spark, rebuilt guaranteed	30.00
6 volt 100 hour Exide Storage Batteries, new	20.00
6 volt 100 hour Century Storage Batteries, new	20.00

BRAND NEW BODIES

Maxwell Touring Bodies (shop worn)	\$35.00
Studebaker 1915, 5 passenger	40.00
Abbott Cloverleaf, complete with top and shield	175.00

WHEELS AND RIMS

Wheels and Rims for all cars	\$3.00 up
Houk Wire Wheels, 34x4½ and 36x4½, per set of five	75.00 up

MISCELLANEOUS

4 and 6 cyl. Motors, rebuilt, send for specification sheet	\$49.50 up
Complete electric lighting outfits for Fords	15.00
Gas Tanks, all shapes and sizes	1.00 up
Battery Boxes, all sizes	1.00 up
Electric Head Lamps, per pair	5.00

Write for a copy of our free bargain bulletin

Puritan Machine Company

47 Puritan Bldg., 415 Lafayette St.
DETROIT, MICHIGAN

IMMEDIATE ATTENTION

TO ALL ORDERS

NEW

Gears, Shafts and Bearings for
over 600 models at great saving.

DEMAND

for our Double Tread Tires

PROVE

their serviceable qualities, especially
adapted for hard country driving.

NOTE THESE VALUES

28x3.....\$4.15	33x4.....\$ 7.80
30x3.....4.75	34x4.....8.00
30x3½.....5.80	34x4½.....9.65
32x3½.....6.75	35x4½.....10.15
31x4.....6.95	36x4½.....10.40
32x4.....7.45	37x5.....11.50

10% More for Non-Skid

One dollar deposit required with each tire
ordered. Shipments made promptly with privi-
lege of examination. No mileage guarantee at
above prices.

AUTO NECESSITIES CO.

4948 Sheridan Rd. Chicago, Ill.

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

MAGNETOS	
Bosch DU Set spark	\$16.50
Bosch DU4 & 6 Variable	20.00
Bosch DR4	16.50
Bosch DR6	20.00
Bosch D4	12.00
Bosch D6	15.00
Bosch ZR6 with coil	35.00
Eisemann	10.00
Remy	7.00
Dixie	10.00
Coils, Generators and Starters. Silent Starter and Generator Chains, all lengths and sizes.	

Lighting and Starting Batteries, \$6.00 to \$15.00	
Carburetors	Springs
Front Axles	Transmission
Rear Axles	Gears
Transmissions	Differential Gears
Axle Shafts	Rims

Pistons, Cylinder Blocks, Crank
and Camshafts, Radiators, etc.

Many good motors in stock.

Tell us your needs

In wrecking cars we obtain and always have for sale a complete stock of parts for all
makes of cars. Also tires and tubes whereby we can save you from 50 to 80 per cent

OUR SLIGHTLY USED TIRES AND TUBES

MEAN ECONOMY TO MOTORISTS :: A TRIAL WILL CONVINCE YOU

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....\$4.00	\$1.35		32x4.....\$7.00	\$1.60		35x4½.....\$8.50	\$1.80	
30x3½.....5.00	1.45		33x4.....7.75	1.70		36x4½.....8.75	1.85	
31x3½.....5.25	1.50		34x4.....7.75	1.70		37x4½.....9.25	1.90	
32x3½.....5.50	1.50		35x4.....8.00	1.75		35x5.....9.50	2.00	
34x3½.....6.00	1.60		36x4.....8.00	1.75		36x5.....9.50	2.00	
31x4.....6.25	1.65		34x4½.....8.25	1.75		37x5.....10.00	2.20	

SPECIAL—Four 41x5 Tires, Rims and Tubes, \$80.00

PROMPT ATTENTION TO MAIL ORDERS

No Mileage Guarantee on Used Tires

Deposit Required with All Orders

MOTOR SALVAGE CO., 1425 State St., Chicago, Ill.

BUY YOUR USED PARTS FROM THE LARGEST
USED PARTS CONCERN IN NEW YORK STATE

50 to 80% Off List Price

Crank Cases .....\$10 to \$75	Cylinder Blocks\$ 5 to \$40
Crank Shafts 5 to 35	Radiators 10 to 40
Gears — Bearings — Springs	

Our stock of the above parts is practically complete. Lamps, Tires, Carburetors,
Magnetos, Coils, Wheels, Rear Axles, Motors. Anything for the automobile.

Money refunded if goods are unsatisfactory

ROCHESTER AUTO PARTS, INC., 135 Culver Rd., ROCHESTER, N. Y.

PULLMAN NEW PARTS FOR PULLMAN CARS
OWNERS A Complete Line of All Parts AT A GREATER SAVING!
ATTENTION! We Undersell Them All!

PULLMAN AUTO PARTS & SERVICE COMPANY
Dept. "P," 115 East 18th St. Kansas City, Missouri

LOZIER REPAIRS

All orders for Lozier replace-
ment parts are now being filled
from our plant at Detroit—and
nowhere else. We have discon-
tinued all branch repair stations.
In the future, all service cor-
respondence and orders must be
forwarded direct to us, as we do
not guarantee the quality or accu-
racy of repairs purchased in any
other way.

LOZIER MOTOR CO.

Detroit Michigan

Parts 50 to 80% off List

Allen	Henry	Overland
American	Hupp	Packard
Apperson	I. H. C.	Paige
Auburn	Inter-State	Paige Detroit
Brush	International	Perry
Buick	Jackson	Pathfinder
Cadillac	Kissel-Kar	Peerless
Carnation	Knox	Pilot
Carter Car	Krit	Pierce Arrow
Case	Leader	Premier
Chalmers	Lexington	R. C. H.
Clark	Little	Rambler
Cole	Lyons-Knight	Reo
Columbia	Lozier	Richmond
Continental	Locomobile	Sampson
Cutting	McFarlan	Silent Knight
Davis	Marion	Speedwell
Detamble	Marmion	Stearns
Elmore	Matheson	Stoddard
E. M. F.	Maxwell	Studebaker
Empire	Mitchell	Thomas
Everitt	Nyberg	Waverly
Flanders	National	Wayne
Great Wes.	Oakland	Wescott
Haynes	Oldsmobile	Winton
Hudson	Overland	Zipp

Main 1579 619 N. Illinois St. New. 22-063
I. WOLF AUTO PARTS & TIRE CO.
INDIANAPOLIS, IND.

Parts and Repairs.

WE ARE PROUD

Thousands of our customers have written their appreciation of our SUPERIOR VALUES.

One Customer Writes

"I have run the set of tires bought from you last November, have run them every day through snow, sleet and gravel and they still look remarkably good. You can count on me when I want more tires."

A TIRE FOR EVERY NEED

At These Prices, Why Hesitate?

	New Tires	New Tubes	Used Tires	Double Tread Tires
28x3.....	\$12.50	\$1.85	\$ 3.50	\$ 4.15
30x3.....	9.10	2.00	4.00	4.75
30x3½.....	10.80	2.45	4.90	5.80
31x3½.....	11.45	2.50	5.40	6.50
32x3½.....	12.65	2.65	5.75	6.75
34x3½.....	13.45	2.75	6.50	7.00
31x4.....	16.60	2.80	6.75	6.95
32x4.....	16.95	2.90	7.00	7.15
33x4.....	17.70	3.35	7.75	7.80
34x4.....	18.10	3.50	8.25	8.00
35x4.....	16.00	3.00	8.00	8.75
34x4½.....	20.65	3.80	8.50	9.65
35x4½.....	22.65	4.00	9.00	10.15
36x4½.....	22.95	3.50	9.25	10.40
36x5.....	25.00	4.00	10.00	11.50
37x5.....	27.75	4.00	11.00	11.50

10% more for non-skid

DO NOT WAIT

Although at the above prices we are unable to give a mileage guarantee, we will, in all cases where reasonable service has not been received, make suitable adjustment in order to hold your patronage.

GEARS :: BEARINGS :: SHAFTS

For All Cars

Everything sent with privilege of examination. One dollar or deposit sufficient to cover express charges required with each order. Balance C. O. D.

AUTO NEEDS COMPANY

1602 So. Michigan Avenue
CHICAGO ILLINOIS

Detroit

and

Briggs-Detroit

Motor Car Owners

Notice

During the past several months, owing to financial difficulties of the former management, there has been considerable confusion as to where Detroit and Briggs-Detroit repair orders should be sent.

With our acquisition of the Detroit Motor Car Company, however, this condition is entirely overcome, and in the future all Detroit and Briggs-Detroit Service will be given direct from our factory at Detroit.

Therefore, to insure prompt attention and handling, repair orders and correspondence must be addressed (as before) to

DETROITER MOTOR CAR CO.

584 Franklin St. Detroit, Mich.

P-A-R-T-S

FOR 100 MAKES CARS

From 1909 to 1917 inclusive

Money Refunded if not Satisfactory

IN FULL ASSEMBLY

We have Motors, Carburetors, Full Floating Rear Axles, Magnetos, of all standard cars

SHIPMENTS MADE PROMPTLY

50 to 90% Off Manufacturer's

Price List

WE WANT YOUR BUSINESS

Write today for prices.

GERTNER AUTO PARTS CO.

1631 O Street LINCOLN, NEB.

Parts and Repairs.

WICHITA AUTO WRECKING CO.

805-809 W. Douglas Ave.

EXCEPTIONAL VALUES IN MOTORS

We have parts for the following cars:
American Underlung
Auburn 30-40
Buick F-10-16-17-19-25-28-29-30-31
Burg 40
J. I. Case 40
Carter Car 5A-L-R
Chalmers F-K-L & Six 10-11M-18-Clark 40
Cadillac 1909-1910
Cameron-Crawford
Detroit-Enger 40
E. M. F. 30-Fal Car
Flanders 2 & 3 speed
Firestone Columbia
Fuller
Ford-N. R. & S.
Great Northern
Halladay-Haynes 1910
Herreshoff-Hupp 20
Hudson 20
I. C. H., 2 & 4 cylinder
Jackson 2 & 4 cylinder
Olympic-Majestic 45-50E
Kissel Kar 40
King-Knox 40
Lambert 2 & 4 cylinder
Lexington 40
Complete Motors, Transmissions and Rear Axles. Money refunded on all parts within 10 days if unsatisfactory.

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The QUALITY of our tires and tubes is superlative, the PRICE cannot be equaled and our SERVICE cannot be excelled.

A satisfied customer is our biggest asset, therefore we must satisfy you.

Size	Tires	Tubes	Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	32x4.....	\$ 7.00	\$1.60	35x4½.....	\$ 8.50	\$1.80
30x3½.....	5.00	1.45	33x4.....	7.75	1.70	36x4½.....	8.75	1.85
31x3½.....	5.25	1.50	34x4.....	7.75	1.70	37x4½.....	9.25	1.90
32x3½.....	5.50	1.50	35x4.....	8.00	1.75	35x5.....	9.50	2.00
34x3½.....	6.00	1.60	36x4.....	8.00	1.75	36x5.....	9.50	2.00
31x4.....	6.25	1.65	34x4½.....	8.25	1.75	37x5.....	10.00	2.20

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly C. O. D., with privilege of examination. Specify style of rim to avoid delay.

Our slightly used tires bear no mileage guarantee; but in the event that they do not give service in proportion to the price, you may return them to us by prepaid express and we will cheerfully make a fair adjustment.

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Tires.

Tires. Magnets and Service Stations.

High Grade New Non-Skid Tires

These tires were absolutely Firsts, only they are slightly mould-blemished and therefore purchased at a price without a mileage guarantee.

30 x 3, Plain...\$ 9.00	32 x 3 1/2.....\$14.55	33 x 4.....\$20.25	35 x 4 1/2.....\$29.15
30 x 3, N. S..... 9.50	31 x 4..... 19.00	34 x 4..... 20.75	36 x 4 1/2..... 29.65
30 x 3 1/2..... 12.40	32 x 4..... 19.40	34 x 4 1/2..... 27.95	35 x 5..... 33.30
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37x4 1/2—Ribbed Tread Cord Tires.....\$40.00

All goods shipped promptly. \$1.00 deposit required with each tire ordered; balance C. O. D., subject to examination, at the above prices without a guarantee; specify whether new or used, clincher or straight side.

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30x3 1/2... 5.00	34x4 1/2... 8.75
32x3 1/2... 6.50	35x4 1/2... 9.50
31x4..... 6.50	36x4 1/2... 9.50
32x4..... 7.00	37x4 1/2... 10.00
33x4..... 7.50	35x5..... 10.00
34x4..... 8.50	37x5..... 11.00

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TIRES and TUBES—A Trial Will Convince You

Largest and most complete stock of slightly used tires in all makes for immediate shipment.—NO JUNK.

Size	Tires	Tubes	Size	Tires	Tubes
30x3.....	\$ 4.00	\$1.35	35x4.....	8.00	1.75
30x3 1/2.....	5.00	1.45	36x4.....	8.00	1.75
31x3 1/2.....	5.25	1.50	34x4 1/2.....	8.25	1.75
32x3 1/2.....	5.50	1.50	35x4 1/2.....	8.50	1.80
34x3 1/2.....	6.00	1.60	36x4 1/2.....	8.75	1.85
31x4.....	6.25	1.65	37x4 1/2.....	9.25	1.90
32x4.....	7.00	1.60	35x5.....	9.50	2.00
33x4.....	7.75	1.70	36x5.....	9.50	2.00
34x4.....	7.75	1.70	37x5.....	10.00	2.20

Freight Prepaid on all orders exceeding \$50.00 when check in full accompanies order, otherwise \$1.00 deposit with each tire ordered. Specify style of rim to avoid delay.

Although at the above prices these tires bear no mileage guarantee, we will make reasonable adjustments should they prove unsatisfactory. All tires sent in for adjustment must be prepaid.

We also carry a complete stock of new tires

AETNA TIRE & SUPPLY COMPANY
1429 Michigan Avenue Chicago, Illinois

HIGH GRADE TIRES & TUBES

BEST VALUES ON THE MARKET
A Trial Order Will Convince You

Size	Plain	Tubes	Size	Plain	Tubes
28x3.....	\$ 9.00	\$2.00	35x4.....	\$21.70	\$3.75
30x3.....	8.75	2.00	36x4.....	22.35	3.85
30x3 1/2.....	11.35	2.30	34x4 1/2.....	25.65	4.15
32x3 1/2.....	13.35	2.45	35x4 1/2.....	26.75	4.20
34x3 1/2.....	15.50	2.55	36x4 1/2.....	27.20	4.30
31x4.....	17.45	3.20	37x4 1/2.....	31.15	4.70
32x4.....	17.75	3.35	35x5.....	30.55	4.65
33x4.....	18.55	3.50	36x5.....	32.90	4.85
34x4.....	19.00	3.65	37x5.....	32.35	4.85

Add 10% for Non-Skid Tires

\$1.00 deposit required. Tires shipped by return express subject to examination. Specify whether Q. D., Clincher or Straight Side Rim. Plain or Non-Skid.

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Phones: Calumet 5212, Calumet 2199

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At the following prices we give no mileage guarantee, but will make reasonable adjustment should tire prove unsatisfactory. All tires sent in for adjustment must be prepaid:

Size	Non-Skid. Tubes.	Size	Non-Skid. Tubes.	Size	Non-Skid. Tubes.
28x3.....	\$ 8.00 \$2.00	31x4.....	\$16.45 \$3.10	34x4 1/2.....	\$22.95 \$4.05
30x3.....	8.45 2.20	32x4.....	16.95 3.25	35x4 1/2.....	23.60 4.15
30x3 1/2.....	11.30 2.40	33x4.....	17.25 3.40	36x4 1/2.....	23.95 4.25
31x3 1/2.....	11.95 2.50	34x4.....	17.95 3.60	37x4 1/2.....	24.95 4.35
32x3 1/2.....	12.95 2.65	35x4.....	18.45 3.75	35x5.....	26.25 4.55
34x3 1/2.....	14.45 2.80	36x4.....	18.95 3.90	36x5.....	27.00 4.75
30x4.....	16.00 3.00			37x5.....	27.95 5.00

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Express prepaid on all orders. A 2% discount may be deducted, if check in full accompanies order. Otherwise a 10% deposit required. Balance C. O. D.

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Manufacturer's Surplus Stock of Factory Seconds

Size	Plain	Non-Skid. Tubes	Size	Plain	Non-Skid. Tubes
28x3.....	\$ 8.35	\$ 8.75 \$1.80	34x4.....	\$17.55	\$18.45 \$3.40
30x3.....	7.95	8.55 1.95	36x4.....	18.95	19.60 3.65
30x3 1/2.....	10.35	10.95 2.30	34x4 1/2.....	22.60	24.90 4.15
32x3 1/2.....	11.65	12.90 2.40	35x4 1/2.....	23.60	25.10 4.30
31x4.....	16.15	16.90 3.00	36x4 1/2.....	23.90	26.60 4.40
32x4.....	16.55	17.30 3.05	37x5.....	30.75	31.45 5.30
33x4.....	17.10	17.85 3.25	35x5.....	29.85	31.30

We warrant each and every casing to give satisfactory service, but do not give any definite mileage guarantee

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"How to Succeed in the Automobile Business" on application. \$40.00 equipment—eight instructors—actual work repairing and driving—day and evening classes.

GREER COLLEGE OF AUTOMOBILE, TRACTOR & AEROPLANE ENGINEERING
1456 Wabash Avenue Chicago, Illinois

If It's Electrical WE CAN FIX IT

Any Starting, Lighting, Ignition System.

WE OFFICIALLY REPRESENT

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K. W. IGNITION DYNETO
BERLING MAGNETO BENDIX DRIVES
PHILBRIN JESCO (Jones Starter)

BRANFORD CARBURETOR
VAN SICKLEN SPEEDOMETERS
WALTHAM SPEEDOMETERS
HEINZ SPRINGFIELD FORD STARTERS
LET THE MAN WHO KNOWS
HANDLE YOUR REPAIR WORK

Arthur Jones Electric Co.

ESTABLISHED 1903
2337 S. STATE ST. CHICAGO, ILL.

RADIATORS REPAIRED PROPERLY

Anybody may attempt to repair your radiator. To succeed is another matter.

SEND IT TO DENVER

W. H. NEVEU, "The Radiator Man"
Largest in the West. 1327-35 Broadway, Denver, Colo.

RADIATORS

We repair Radiators of all kinds—Any Make or Any Style

MITCHELL RADIATOR REPAIR COMPANY

933 Ft. Wayne Ave. Indianapolis Indiana
Buy and Sell Used Radiators

RADIATORS

OUR HONEYCOMB RADIATOR embodies STRENGTH COOLING POWER NEATNESS
Repairing and recoring old radiators. Everything in the automobile sheet metal line
We solicit your inquiries

ILLINOIS AUTO SHEET METAL WORKS
Veteran Radiator Experts of the West
3200 S. Michigan Ave. Chicago, Ill.

W(RIGHT) RADIATORS

Have stood the test for years—most durable and efficient. Get the best at less cost than others. Don't order until you send for our prices and illustrations of construction. Honeycomb and Bridge Pin Type (tubular). All standard makes in stock. Exceptionally low prices on Fords. Dealers' discount.

WRIGHT COOLER AND HOOD CO.
1253 Michigan Avenue Chicago, Ill.

RADIATORS

Get a Square Tube Radiator, 25% greater water capacity. Made for any car. New, guaranteed cores placed in old radiators. We also manufacture hoods, fenders, tanks and pans, and do guaranteed repair work. Prompt and satisfactory service.

CHICAGO MANUFACTURING CO.
1458-60-62-64 Michigan Avenue Chicago, Ill.

Pioneer

RADIATOR Manufacturers

Rebuilding, Repairing, and Manufacturing of Radiators for any make of car. Why send your Radiator down East when you can ship to us; save time, expense, freight, money, and be assured of expert workmanship? Our prices are right. We make new Radiators and allow for old ones.

TODD MANUFACTURING CO. Minneapolis, Minn.

PATENT FOR SALE

Puncture Proof Tire can be made for any make tire, and used in new or old tires.

No Inner Tube

JOHN H. KOSSMANN

2143 Hickory St. St. Louis, Mo.

AUTO MAILING LIST

44,755 Auto Dealers, U. S. \$3.00 per M.
7,949 Ford Dealers, U. S. \$20.00, or 4.00 per M.
5,519 Truck Dealers, U. S. \$12.00, or 4.00 per M.
(Showing make of truck handled.)
150,000 Truck Owners, U. S. 7.50 per M.
5,400 Truck Owners in Chicago, \$15.00, or 3.50 per M.
46,943 Garages, U. S. 3.00 per M.
55,967 Auto Supplies, Retail, U. S. 3.00 per M.
45,054 Repair Shops 3.00 per M.
404 Auto Mfrs. 3.00 per M.
73,674 Auto Dealers, Garages, Supplies and Repairs in one list, no duplicates 3.00 per M.
1,502 Auto Supply Jobbers \$5.00
Complete list auto owners and Ford owners, \$2.50 per M. Further particulars

TRADE CIRCULAR ADDRESSING CO.
166 W. Adams St. (Franklin 1182) Chicago

INDIANA AUTO LISTS

200,000 names, compiled by counties in type-written form, showing name, address, make, model and 1918 registration number. Special lists of any make of car. Can furnish list dealers in any state.

CAMPBELL CIRCULAR ADVERTISING CO.
PRINTING MAILING ADDRESSING
240 South Meridian St. Indianapolis, Ind.

EXPERT WELDING SERVICE

Cylinders, Crank Cases, Housing and Gear Cases welded by our expert method—prices reasonable.

SUPERIOR WELDING CO.

331 Knoxville Ave. Peoria, Ill.

GARAGE FOR SALE

Best location in central Illinois for Garage business. Cheap rent, fire proof building and no competition. Complete shop. Reason for selling—going into other business.

CLEMENTZ GARAGE

Long View Illinois

A FORD NECESSITY—The Willard Superheater

\$5 You can save gasoline with a Willard Superheater—an efficient, inexpensive little device that extracts the last atom of energy from every particle of gasoline that enters the carburetor. You can install it in ten minutes with one wrench.

WILLARD MANUFACTURING CO.
South Bend Special offer to dealers & agents Indiana

CONTRACT WORK

Advertisers in this section have facilities at their disposal to take on additional work on contract. Automobile specialties of all kinds manufactured on contract basis. Special machinery, press work, auto machine work, foundry work, automatic screw machine work.

METAL STAMPINGS, JIGS, DIES, GAGES, SPECIAL TOOLS, ETC.

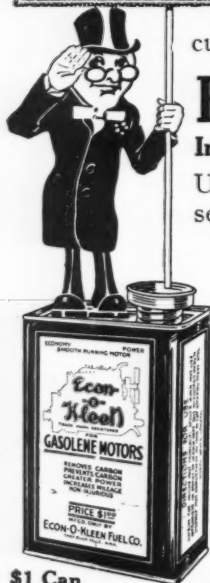
KRASBERG MFG. CO.

536 LAKE SHORE DRIVE CHICAGO
Opp. Municipal Pier

All Classified forms are now closing Friday noon. Be sure all orders and copy are mailed to reach us not later than Friday morning.

MOTOR AGE

Save Gasoline!



\$1 Can
Prepaid. Treats 112
gallons. Goes in
with the gasoline.

Get More Profit

for yourself, get more pleasure for your customers, and save one-fourth of your customers' gasoline costs by selling them

ECON-O-KLEEN

Improves Gasoline Burns Carbon

Unless you're an exception a part of your service work is cut off—short of help in the repair shop—overhead going up—receipts falling off—customers grouchy.

Econ-O-Kleen solves the problem. It introduces extra oxygen into the gasoline mixture, burning it clean—cleans out and prevents carbon—makes perfect fuel of low-grade gasoline—gives motors more pep—more power—15% to 30% more mileage on gasoline—is absolutely free from picric acid and injurious chemicals. Every can guaranteed and we protect you on the profit.

Dealers Econ-O-Kleen sales are growing stronger every day. Write for terms. Econ-O-Kleen will solve that overhead problem for you.

ECON-O-KLEEN FUEL COMPANY

104 Labree Avenue

Thief River Falls, Minn.

Have You Had Trouble With Your Tires?

The fault is not with the tires. You, or your chauffeur, or both, are to blame. The responsibility is yours because you should keep the tires pumped up to a specified pressure, and don't.

Tires that are kept up to the proper air pressure last twice as long—sometimes ten times longer—than tires that are run with not enough air in them. Measure your air daily with a

SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

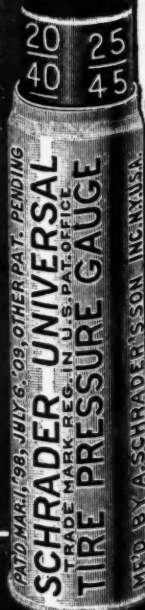
and get out of your tires all the miles they can give.

Price in
U. S. A. **\$1.25**

At your dealer or

A. SCHRADER'S SON, Inc.

783-803 Atlantic Avenue, Brooklyn, N. Y.



SCHRADER UNIVERSAL TIRE PRESSURE GAUGE

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THE ADVERTISERS' INDEX is published as a convenience and not as a part of the advertising contract. Every care will be taken to index correctly. No allowance will be made for errors or failure to insert.

WONDER WORKER

Take the precaution to choose all of your auto chemical specialties from one complete, all-satisfying line, because

- (1) your experience with one article will give you a line on the quality-standards of the others
- (2) you will get a specialty for every use or emergency without experimenting with other lines about which you know nothing
- (3) you'll get a specialized preparation for just the job in hand, without resorting to makeshift preparations which threaten injury to your car.

The 46 chemical specialties of the WONDER-WORKER line offer you an exactly suitable article for every motoring need. May we send the catalogue for your information?

THE HALL-THOMPSON CO.
HARTFORD CONNECTICUT



WHEREVER a real truck is demanded, the Oneida has earned the right of first consideration.

Designed by engineering skill second to none, powered to meet every emergency of load and road, it stands as a great achievement in the motor truck world. Dealers: Write or wire. Your territory may still be open. 1, 1½, 2, 3½ and 5 ton models. All worm drive.

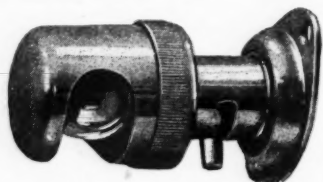
PROMPT DELIVERIES!

Oneida Motor Truck Co. FACTORIES: GREEN BAY, WIS.

ONEIDA

MOTOR TRUCKS

Insist on *Presto Products*



**"PRESTO" BULL PUP
DASH LAMP No. 647-S**

PRESTO Specialties are demanded by motorists because they know the prestige of these products.

Presto Combination Lamp No. 230-S is used as a dash lamp all the time and affords the convenience of a trouble lamp in case of emergency. This lamp is in great demand where a general utility light is wanted, because it is 2 lamps in 1.

Presto "Bull Pup" Dash Lamp No. 674-S is a strong, heavy, short lamp built for service and hard wear. Only 2" from dash to center of bull.

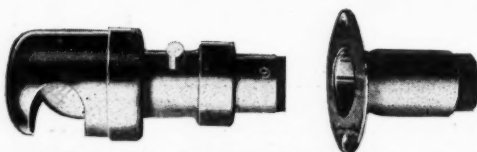
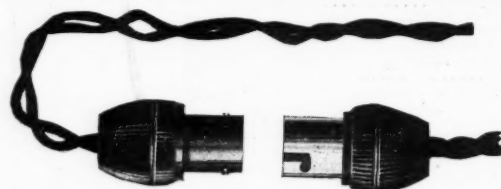
The Presto Brace is exceedingly strong and built scientifically like a trussed steel structure. Stops vibration—voids sagging of running boards and prevents broken springs—prevents uneven strain—holds drive shaft in position—holds all mechanical parts in alignment—equalizes spring action—easily installed; no holes to drill; no mechanic necessary.

Price only \$3.50 in U. S. A., except west of Rockies, \$4.00. In Canada, \$6.00.

DEALERS—If you are not now handling the Presto line get in touch with us for details concerning this famous line of over 100 automobile accessories.

Metal Specialties Mfg. Co., 338-352 N. Kedzie Ave., Chicago

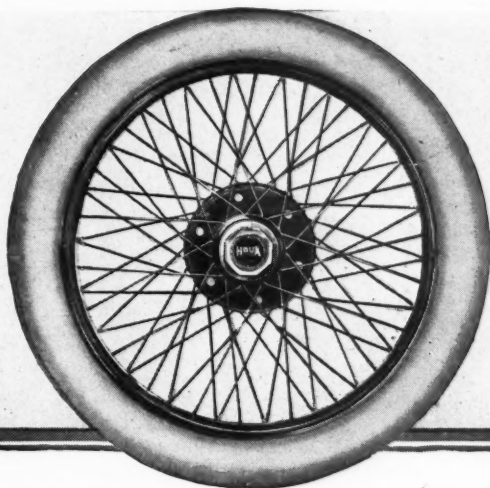
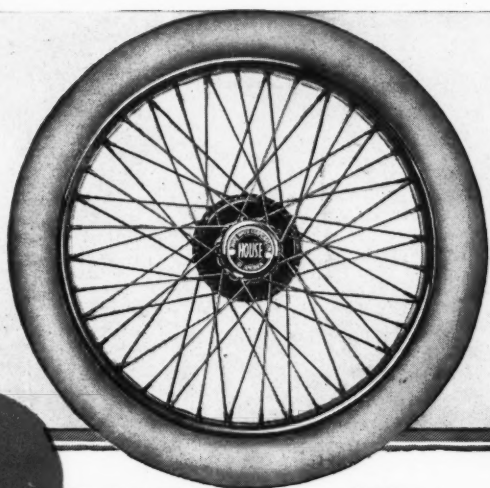
Eastern Branch.....16-24 West 61st Street, New York
Western Branch.....149 New Montgomery St., San Francisco



**"PRESTO" COMBINATION DASH
AND TROUBLE LAMP No. 230-S**



Presto Running Board Brace for Fords



2 Big Opportunities

HOUSE

for Fords

List price for set of 5 wire wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, one hub dust cover for spare wheel, \$60. White, black, red. Colors optional.

\$60

IN ORDERING WHEELS OR PARTS

Always specify make, model and year of car. Also size and type of tire, whether straight side or clincher, with diameter of hub cap at threads. This information should accompany every order for any part.

Service and Sales Agency

Established dealers can secure the Wire Wheel Service and Sales Agency where territory is vacant.

We co-operate with automobile dealers, garages, etc., in giving SERVICE to owners of wire wheel equipped automobiles.

For dealer proposition address

WIRE WHEEL CORPORATION of AMERICA
(Successors to Houk Manufacturing Co.)

Factories: BUFFALO, N. Y., and SPRINGFIELD, MASS.

Direct Factory Branches and Service Stations:

New York, 835 Eleventh Ave. at 57th St. Chicago, 23rd and Indiana Ave.
Philadelphia, 328 North Broad St. Detroit, 16 Davenport St.
Los Angeles, 1216 South Grand Ave. San Francisco, 1690 Pine St.

HOUK

QUICK CHANGE
FOR

Name of Car	Model	Year	Name of Car	Model	Year
Abbott	6-44, 6-60	1917	King	EE	1917
Anderson	6-60	1917	Kissel	100 point 6	1917
Anderson Elec.	1917-8		Kissel	12	1917
Ap's'n R'dapl.	6-60	1917	Kline	6-38	1917
Apperson	6 & 8	1917	Lexington	6-O	1917
Auburn	1917		Liberty	10-A	1917
Baker R&L.	G-A	1917	Locomobile	R7&M7	1917
Barley	Roamer	1917	Lozier	82 1914 84	1917
Biddle	D	1917	Madison	6-40	1917
Bour Davis	17	1917	McFarlan	127	1917
Briscoe	4-48, B-24	1917	Mar. Handley	6-60	1917
Buick Various Models			Marmion	34	1917
Cadillac	55	1917	Maxwell	25	1917
Case	40	1917	Mercer	22-73	1917
Chalmers	35C	1917	Milburn		1917
Chalmers	6-40or32B	1917	Mitchell	C-42, D-40	1917
Chandler	1917		Moline	Knight	1917
Chevrolet	8 cyl.	1917	Moon	6-43, 6-66	1917
Cole	8 cyl.	1917	Murray	70-T	1917
Columbia	D	1917	National	6 & 12 cyl.	1917
Crow Elkhart	C-E-35	1917	Oakland	50, 34	1917
Cunningham	V	1917	Olds	45, 37	1917
Daniels	A	1917	Overland	All Models	1917
Darling		1917	Owen Magnetic	O-36	1917
Davis	Light 6	1917	Packard	225 & 235	1917
Disbrow	Special	1917	Paige	H-6 & K-6	1917
Dixie Flyer		1917	Paige	G-6 & J-6	1917
Dodge		1917	Pathfinder	3-B	1917
Dorris	6 cyl.	1917	Patterson	6-45	1917
Dort	9 & 6	1917	Peerless		1917
Economy	4 cyl.	1917	Pierce	6-48, 6-66	1917
Economy	8 cyl.	1917	Pilot	6-45	1917
Elcar	D. E. F.	1917	Premier	6-B	1917
Elgin		1917	Pullman	4-24	1917
Empire	50	1917	Regal	J. F.	1917
Empire	70-70 A	1917	Reo	R	1917
Enger	Twin Unit	1917	Roamer		1917
Erie	33 & 34	1917	Ross	C	1917
F. I. A. T.	55	1917	Saxon	S-4	1917
Franklin	Series 9	1917	Scripps	4 cyl., 8 cyl.	1917
Grant	K	1917	Singer		1917
H. A. L.	21	1917	Standard	E & E	1917
Harroun		1917	Stanley	Steamer	1917
Haynes	6 cyl. 36	1917	Stearns	32-33-Sk-8	1917
Haynes	12 cyl. 40	1917	Studebaker	SF&ED	1917
Hallier	186	1917	Stutz	R	1917
Hudson	Super Six	1917	Velle	28	1917
Hupp	N	1917	Vim		1917
Interstate		1917	Westcott	S-17, U-50	1917
Jackson	349	1917	White	16 valve 4 cyl.	1917
Jeffery	472 & 671	1917	Winton	22-A	1917
Jordan	60	1917			

Additional Models

In addition to list we can supply sets of Houk wire wheels for the majority of these makes of cars of older models.

War Sale of Tire Repairs *Greatest in History*

Dealers! Don't Miss
This Opportunity



All-Ready Cementless Patches. Ideal for quick road repair. Just moisten with gasoline and apply to tube.



Miller's Wizard Fixall makes permanent repair of tubes, casings and all kinds of rubber goods. Handy, swift and clean.



Miller's Lacehold Boots ideal for emergency repair of blow-outs, cuts, etc. Built of many plies of tire fabric.



Flannel-Back Blow-Out Patch. Self-curing. Four sizes to fit all casings. Flannel-Back protects tube from chafing.

Miller Rollers are shaped to fit interior of casing snugly. Many plies of strong fabric cured together like casing.

Miller Shur-Tite Rubber Kit will mend anything from a puncture to a long slit in an inner tube.



Miller Uniform Accessories and Repair Materials

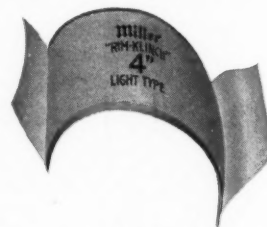
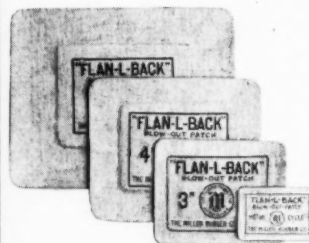
Every price advance in tires will mean increased accessory business to the dealer. New tires are not being bought on such a large scale as in the past. Motorists are practicing economy—getting the last possible mile out of their tires.

If you can supply your customers with money saving and mileage increasing accessories it will help build up your business generally. Miller Uniform accessories are made by master hands. And the quality that goes into them assures you a permanent and satisfied customer. All Miller accessories do their work thoroughly and well. Be the job large or small, there is one for every need.

Why not take advantage of present conditions? With the constant rise in tire prices the possibilities of building up a good accessory business were never better. Write us today for further particulars on the Miller line of Uniform Products.

THE MILLER RUBBER COMPANY
Dept. A-34 AKRON, OHIO

Makers of Miller Uniform Tires, Red and Gray Inner Tubes and Miller Surgeons Grade Rubber Goods for homes as well as hospitals



Miller Rim Klinch Blow-Out Patch shaped to fit snugly. Fabric wings fit under bead. Made in sizes from 3 inches to 5 inches.

Pluggum—tough, plastic rubber compound, self-curing for tire surface cuts and abrasions in outer casings.



Miller Hook-Hold Boot for covering blow-outs and cuts. Hooks to flange of rim on clincher type and under tire bead on straight side type. Fits firmly.